HOUSE PLANNING AT HOME

A PRACTICAL MANUAL FOR SELF-INSTRUCTION

FOR MEMBERS OF BUILDING ASSOCIATIONS
AND OTHERS

— BY —

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SAINT LOUIS
C. B. WOODWARD COMPANY
1894

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CHAPTER I.

INTRODUCTION.

FOLLOWING pages explain the elementary principles of architectural plan drawing clearly enough, it is hoped, to be intelligible to ordinary readers with no previous knowledge of the subject, and without the aid of a teacher. Expert draftsmen must not be disappointed if they find little that is new to them, since the work is intended for amateurs only. The necessity of confining the book within narrow limits of size and cost, so that its price shall be no barrier to its universal use, compels the omission of much interesting matter, which may perhaps appear in a later volume. Its brevity and simplicity may render it acceptable as a text-book in schools, where a thoroughly practical course in plan drawing would be welcomed, could it be condensed within the limited time available for it.

The advertisements will be of value to all concerned in drawing, building, decorating or furnishing, since none but responsible names appear, which can be addressed in confidence for information, prices, etc.

This elementary book does not teach architecture "in one lesson;" nor will it encourage "every man to be his own architect." A well-known proverb says, "The man who is his own lawyer has a fool for a client." This applies to architecture as well as to law, with this difference, perhaps, that a man who has been his own architect for any important building, is apt to regret his choice of both architect and client.

As a rule, professional help pays: the most successful men always employ it. If an architect is sick, he consults a good physician, or ought to; if in legal trouble, he engages a first-class lawyer. The doctor and the lawyer, in turn, when they need a house, or an office, or a store, will save money, worry and loss, by employing the best architect within reach. Here is the royal road to the best and handsomest house for the money.

A first-class architect knows so well how to manage and economize, that he often saves to the owner more than the entire amount of his commissions, not to mention the superior convenience and beauty of the building, which really constitute its highest value, and which the owner actually gets for nothing.

But many a headache and bruise are cured without a doctor, and many a little tiff between neighbors is made up without a lawyer. So every year there is a vast amount of building in a small way which does not concern architects. Its cost is so trifling that an architect's five or ten per cent. would not begin to pay for his time, and it is so simple that it almost goes of itself without professional assistance. Still a plan is generally needed, and there is no reason why the owner should not make it if he knows how.

Moreover, architects' fees are so very small (five to ten per cent. on the cost of the work), and their office expenses are so large, that it takes a great amount of building to support them ; hence, they are located mostly in the cities. When people who live in the smaller towns or in the country want to build, they must go or send to the city for their architect, or do without. Each alternative has its objections ; but when the owner can properly draw a skeleton plan for himself, to show what he wants, he can often deal satisfactorily with a distant architect through the mails, and thus save the time and expense of many a personal journey back and forth by himself and his architect.

Nor is this all : A man may live in the city and may have an architect for a neighbor at each side, yet, if unfamiliar with plan drawing, he will find much the same trouble in consulting his architect as a man who tries to converse with the deaf and dumb while ignorant of the sign language. Nothing is more common than for owners to tell their architect they "cannot make head or tail out of the drawings," which they are nevertheless expecting to have transmuted into enduring stone, brick, and iron at their expense. So they enter blindfold, as it were, upon a building enterprise which may cost them thousands or hundreds of thousands of dollars, and have their eyes opened only when the house is erected, and its wonders of beauty or of ugliness stand forth in permanent form to the lasting delight or enduring mortification of the man who pays for it all.

Doubtless many an architectural monstrosity might have been spared to the suffering world, had the owners actually understood the drawings in advance of letting their contracts.

An old maxim says, "The best way to understand a thing is to learn to make it." The way to understand plans is to learn to make plans—not necessarily to become an accomplished draftsman, but to master the simple art of drawing to scale with the ordinary conventional signs used in architectural plans.

Reserving the best for the last, we remark that after all, it is not the masculine fraternity which is most deeply interested in the art of house-planning, but the wives and daughters—those who are to live in the house, and work in it; who are to furnish it, adorn it, take care of it, entertain in it—these are the ones who, if they could only draw, would undoubtedly make a dozen house plans to one by the other sex. Probably we never shall know how many a "*perfectly lovely*" combination of stair-hall, reception-room and dining-room, of front veranda and side porch, of sleeping-rooms, guest-room, etc., etc., has been lost to the world, locked up hopelessly in the busy brain of some ingenious, practical woman, simply because she cannot draw.

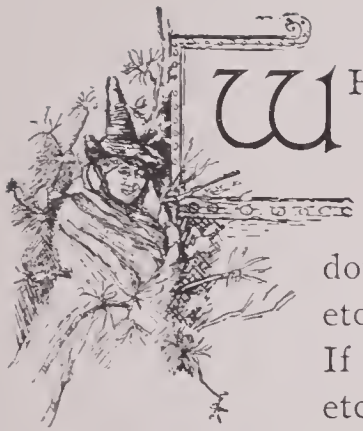
This manual offers a helping hand to these voiceless planners. It is an architectural primer—to explain the first principles of making scale drawings and outline plans. These are set forth so minutely and simply that "he may run that readeth." Readers who have never been in an architect's office, and are wholly unfamiliar with his modes of working, may here learn to lay out a plan and develop preliminary sketches for themselves readily and correctly.

Thus it offers the key to one of the most fascinating employments possible to an active and ingenious mind, endowed with original ideas and refined tastes, viz.: the planning in detail of an ideal home, a modern paradise, where work and worry shall be reduced to a minimum, where beauty and refinement shall dwell in lasting harmony.

Those who may wish to pursue a more thorough study of Architecture will find in the Architectural Reference Book by Charles E. Illsley, price $0.25, the list of books recommended for self-instruction by the Royal Institute of British Architects.

CHAPTER II.

DESCRIPTION OF HOUSE PLANS AND PLANNING.



WHAT are called the "plans" of a house are really horizontal sections taken at various levels. Thus the cellar plan is a horizontal section taken below the first floor, and showing the location, length and thickness of all foundation walls and piers, the cellar steps, partitions, areas, etc., the location and width of cellar windows and doors, and often, by dotted lines, the location and sizes of the drains, sewers, etc. It is customary to color the foundation walls blue if of stone, and red if of brick. If a hot-air furnace is intended the cellar plan should show its location and its pipes, etc. The first story plan is a horizontal section taken at such a point between floor and ceiling as to show all walls and partitions with their material, length and thickness; all doors and windows, the fire places and flues, the stairs, the hot-air pipes, the soil pipe from the water-closet, the kitchen sink, boiler, etc., and the outside steps, porches, verandas, etc. Stone walls are colored blue, brick walls red, and stud partitions or walls yellow. In planning parlor and dining-room it is well to draw to scale the principal articles of furniture, such as the piano, the side-board, book-case, etc., in order to be sure that there will be a suitable place for them. *

The second story plan is a horizontal section between floor and ceiling of the second story showing corresponding features in this story. It will show all walls and partitions, all stairs, halls, closets, bath-room with its fixtures, all flues and fire places, all pipes rising above the second story ceiling and all doors and windows; also the roofs of the first story porches, verandas, etc. It is important in planning bed-rooms to locate and draw the beds and other principal furniture in order to make sure of a suitable place for them. If a hot-air furnace is to be used for heating, the plans must show all the pipes and registers. If steam or hot water is intended the plans should show where the radiators will stand.

* The methods of drawing to scale are explained in Chapter IV.

An attic plan and a roof plan are often very serviceable. In general, the more numerous and complete the plans the better is the prospect of an entirely satisfactory house. A roof plan will show the ridges, valleys, dormers and gables, if any, the chimneys, gutters, etc.

It is customary to mark on the plans with a cross or a dash, in red ink, the location of all gas or electric wire outlets for wall or ceiling lights. Wall lights are called "brackets," ceiling lights are "drops" or "chandeliers."

The drawings which represent the front of the house, its sides, rear, etc., are called the "elevations." These will show the porches, verandas, etc., with their roofs, balconies, steps, railings, columns, etc., also all outside doors and windows and the chimneys, gables, dormers, roofs, etc. It is well to figure on the elevations of windows, the sizes of glass to be used. These sizes are generally in even figures, as 8x10, 8x12, 10x12, 10x14, 10x16, etc., such sizes being made and kept in stock. Dealers in glass often circulate gratis little books which give the stock sizes of glass, and are very convenient. When window glass is eighteen inches or more in its least dimension it is usually advisable to use double strength glass (about one-eighth of an inch thick). This is marked D. S. on the elevations. Write the words "plate glass," "stained glass," etc., where such glass is wanted. In windows to bath-rooms, water-closets, etc., it is well to use some form of obscured enameled or ground glass, for obvious reasons.

Sometimes, in addition to the plans and elevations, architects make "sections," as they are called. These are vertical sections of a building showing its appearance, for example, if the front wall were removed or the side or rear wall, disclosing the thickness of its floors, the heights of the various stories, the doors, stairs and other features as seen "in elevation," as it is called. The construction of "sections" requires more architectural skill than the plans and elevations. In plain work they may often be dispensed with.

In important work architects usually make in addition to the plans, elevations and sections, what are called "scale details," generally to a scale of one-eighth or one-sixteenth full size, also full-size details of all the principal features. Such elaborate drawings demand skill and experience; they are not likely to be required in the plain and simple buildings contemplated in this manual.

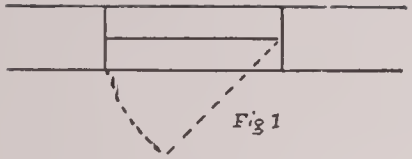


Fig 1

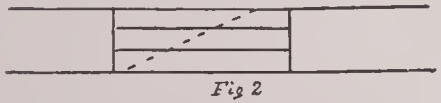


Fig 2

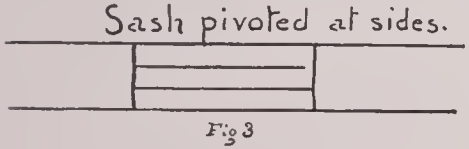


Fig 3

In sketching a house plan some people write the letters D. and W. on the drawings wherever they want a door or a window. It is better to use the conventional signs customary with architects and always understood by builders. A window may be designated by an opening in the wall in which the outside lines of the wall are continued and one or two lines to denote the sashes are drawn between them, as in Figures 1, 2 and 3. If the sash is to be hinged at one side it may be dotted as in Fig. 1; if pivoted at top and bottom so as to revolve, it may be shown as dotted in Fig. 2. Fig. 3 is for sash pivoted at both sides, the top to swing in and the bottom to swing out.

Some draftsmen show windows with more elaboration of detail, drawing the box frame, the projecting sill outside, the recess inside, etc., in the belief that such drawings are "more accurate" than others. This is not recommended, however, because the supposed greater accuracy consumes time and complicates the drawings to no useful purpose. If the elevations and specifications are properly drawn, the method of showing windows above described is all sufficient for the purposes of the builder, who will pay no attention whatever to any greater elaboration except to be confused by it. The main object of the plan in respect to the windows is to show their location and width, and whether the sash slide or swing.

Where window sashes slide and are balanced by weights, as is the custom in good work, "box frames" must be specified. Their construction is shown by large scale in Fig. 4. As above remarked, it is not necessary to give this amount of detail in the plans of a house. It suffices to draw the windows, as has been advised, and then to state in the specifications that they will have "box frames." The box is the vertical space in which the weights rise and fall. The sashes are fitted, then glazed, then

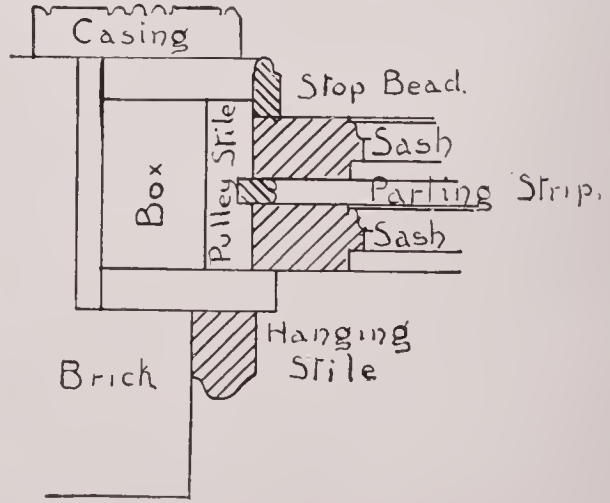


Fig. 4.

weighed, and narrow cylindrical weights of cast iron are made, each equal to half the weight of one sash. These are hung to the sash by hemp cord called "sash cord," a rope made expressly for this purpose. It runs over cast iron grooved wheels or "pullies" screwed into the "pulley stiles" of the window frame. The Italian sash cord has long been considered the best, although various other cords are in the market, as also are metal chains and ribbons for extra heavy sash. With the latter a special article of lead weights is sometimes used. Plate-glass sashes of large size usually require lead weights. There is quite a variety of "sash pullies" as well.

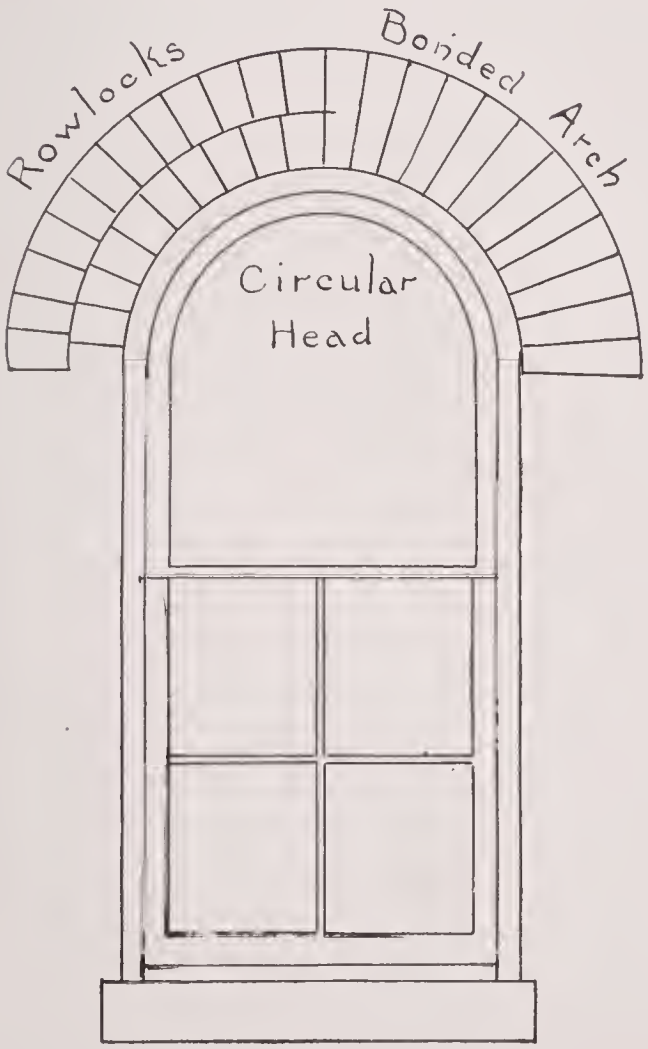


Fig. 5.

Strictly speaking no "boxes" are made to "box frames" in wooden houses, the nearest wall stud being set far enough away to leave the necessary space or "box" for the weights. In brick or stone houses only is the "box" necessary as a stop to the masonry, which is built against it.

What are called "plank frames" have no space for weights, consequently no pullies nor cord. The sashes may slide, in which case some sort of fastening must be provided to hold them up, or down, or they may be hinged or pivoted so as to swing out or in. There are also for plank frames various "sash balances" containing an adjustable coiled spring to balance the sash just as the weights do.

Good sashes are usually 1⅜ to 1¾ thick. The "parting strip" (Fig. 4) separates the sashes by one-half inch. This would leave a space one-half inch wide all across the window between the top rail of the lower sash and the bottom rail of the upper sash through which the cold could enter. To

close this space the "meeting rails" of the sashes are made thicker than the other parts and are beveled so as to fit accurately and close this space. Such are called "check rail" or "lip" sashes.

In very cheap windows the parting strip is omitted, the upper sash is fastened in place and the lower one slides up against it. These are called "plain rail" sash, and are 1 1/8 inch thick.

The top and bottom members of a sash are its "rails;" the sides are "stiles," and the dividing strips are generally called "muntins."

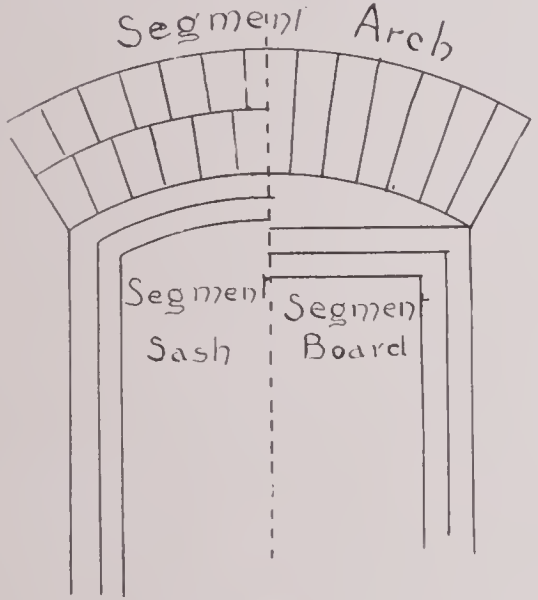


Fig. 6.

There is considerable variety in the shapes of windows. Fig. 5 shows a "circular head" window in brick work, its head being in fact a semi-circle. The arch bricks may stand "on end" as in the right half, or on their long sides. The former is a "bonded arch," the latter a "double rowlock." A single course would make a "single rowlock;" three courses would be called a "triple rowlock." The rowlock arch is considered stronger than the bonded arch, but is not thought to look as well. Bonded arches may be in several courses also, and they are sometimes made of "Roman bricks" which are twelve inches long.* Sometimes a border is added above the arch, either of plain or of moulded bricks. This is called a "label moulding."

Fig. 6 shows a "segment head" window, with a bonded arch at the right and a double rowlock at the left. The radius of the arch may be equal to the width of the opening. If the frame and top sash are curved, as in the left half of this figure, it is termed "segment sash." Often the top sash and frame are square, as in the right half of this figure, the space between frame and arch being closed by a curved board. This is called a "segment board" frame, and is cheaper than the other.

It is quite the fashion in many quarters to finish brick window heads as in Fig. 7 either with

*An ordinary brick is 2x4x8, *i. e.*, two inches thick, four inches wide and eight inches long. These sizes are not exact, however, there being considerable variation due to the processes of manufacture. A hard burned brick is smaller than one which has been less affected by fire.

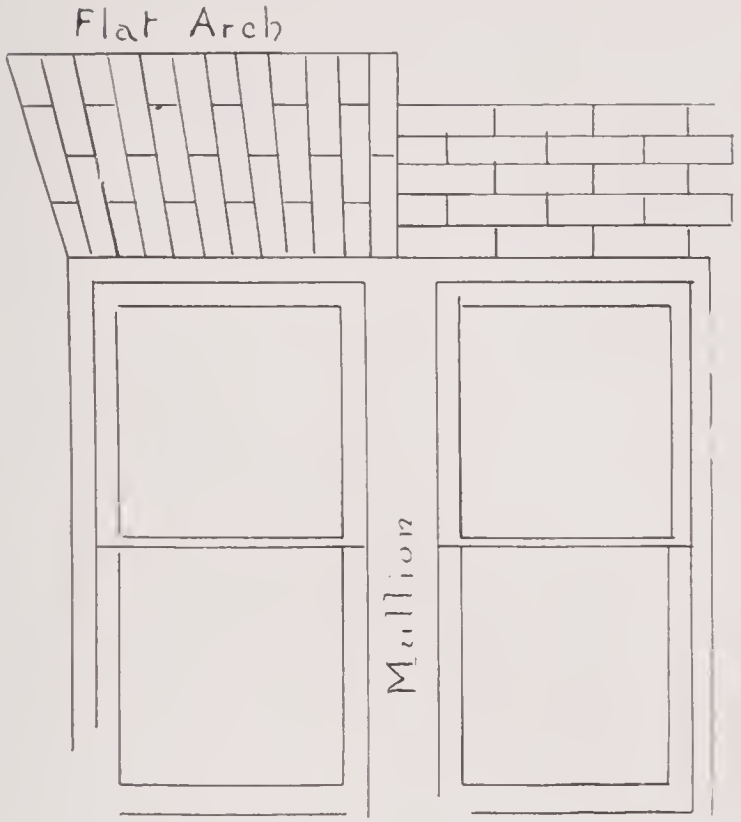


Fig. 7.

beveled bricks on end or with common bricks laid flat. The former style is thought to have originated in Holland, whence it is called a "Dutch Arch," though its only resemblance to an arch is in the beveled shape of its members and in the fact that it is self-supporting. A full size drawing must be made of such a window head and the bricks must be ground accurately to the correct shape and laid with special care. The segment and Dutch arches produce a lateral thrust which requires strong walls or abutments at each end.

The flat construction in the right half of Fig. 7 produces no lateral thrust, but it is not self-supporting. An iron or steel bar or lintel must be provided to span the entire opening and support the bricks above it.

The principles above stated apply equally to stone work, although the tenacity of good building stone makes it possible to cover a window opening with a single stone cap as in Fig. 8. This makes an excellent construction without lateral thrust.

Windows may be set singly or grouped in various ways. The grouping of windows, called "fenestration," is an important source of architectural effect. When placed very closely the divisions between windows are called "mullions," and the combination is called a "mullion window." This may include two windows with one mullion as in Fig. 7, or there may be many windows and mullions in the group. The mullions may be of wood as in Fig. 7, or they may be of brick or stone. In Gothic architecture elegant effects are produced by delicate stone columns with carved or moulded caps and bases used as mullions.

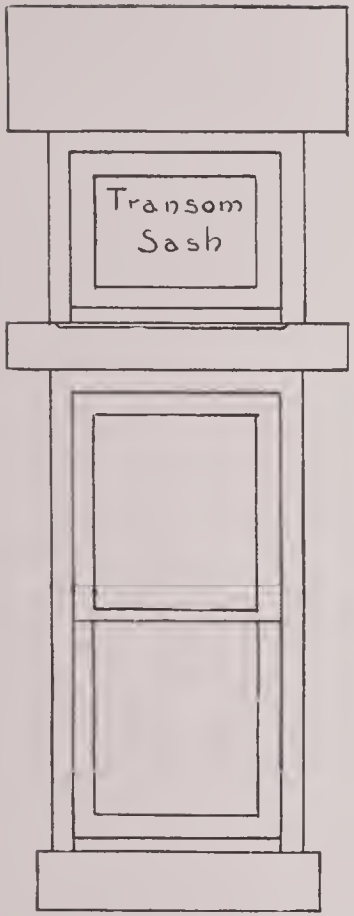


Fig. 8.

Sometimes, as in Fig. 8, an extra sash is placed at the top of a window, called a "transom sash," and either permanently fixed in place or hinged or pivoted so as to swing open. The division between the transom and the main window is the "transom bar." It may be of stone, as in Fig. 8, or of wood or other material. The practical use of transoms apart from architectural effect is for ventilation without the draughts caused by opening the window below. They are often difficult to close securely against the weather.

The same forms as above described are used for door heads, except that mullioned doorways are rare. In stone houses and in brick buildings of the best class the door and window frames are generally set back quite deep within the wall. This depth is called the "reveal." A deep reveal adds much to the external effect of a door or window. In ordinary brick houses the reveal is very shallow, not over two or three inches.

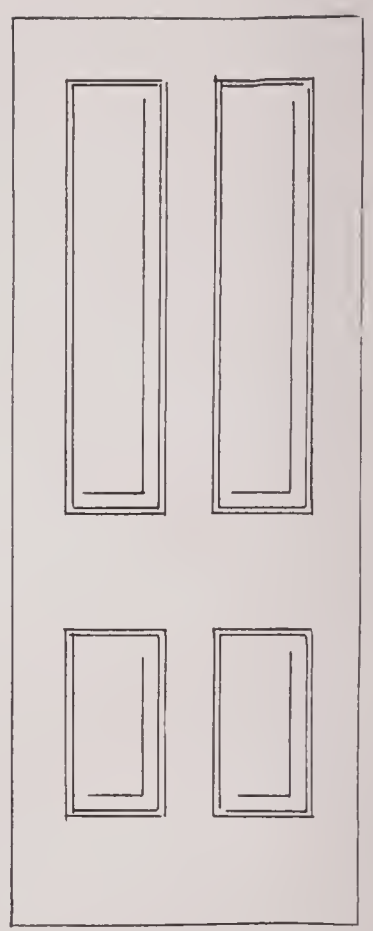


Fig. 9.

In panel doors the vertical strips are called "stiles," as in sashes, and the cross pieces are "rails"—the bottom rail, the lock rail and the top rail. The most common form of door has four panels, as in Fig. 9. The inner edges of the rails and stiles may be square edged, or moulded "on the solid," as it is called (see Fig. 10), or strips of moulding may be cut and mitred and tacked in all round the panels. See Fig. 11. These mouldings may be so thick as to project above the frame and lap over slightly on it. Such are called "lap-moulded doors." If the mouldings do not project, the door is "flush-moulded." The solid moulded doors, often called

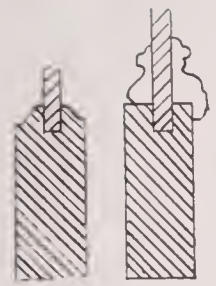


Fig. 10. Fig. 11.

O. G. doors, are cheaper than flush or lap-moulded doors. They are 1 1/8 to 1 3/8 thick and are kept in stock in sizes ranging from 2 x 6 x 1 1/8 to 3 x 7 x 1 1/8. 1 3/8 O. G. doors are made in sizes from 2 x 6 to 3 x 9, and 1 3/4 doors from 2-6 x 6-6 to 3 x 9. For a full list of sizes application should be made to a planing mill or to a lumber dealer. The flush and lap-moulded doors are 1 3/8 to 1 3/4 thick.

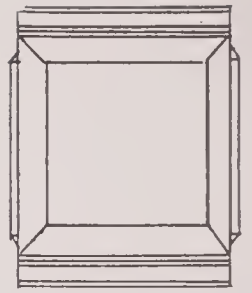


Fig. 12.

In the so-called "Queen Anne" or "Eastlake" styles, which were popular twenty years ago, the borders of panels were "stop chamfered," as shown in Fig. 12. This consisted in beveling the sides of the rails and stiles for most of the length and breadth of the panel. Sometimes the chamfers were all round the panel; oftener they were at the sides only, the top and bottom being fitted with bits of straight moulding neatly cut into place, as in Fig. 12. This was thought a better security against the effects of shrinkage than was afforded by the mitred joint in flush or lap-moulded work. This fashion has now almost entirely disappeared. The central part of the panel is often slightly raised above its edges. This is a "raised" panel. The material of the door may be white or yellow pine, cypress, etc. The stiles and rails may be of cypress and the panels of yellow pine, if desired.

What are called hard wood doors are seldom of solid hard wood, which is heavy, expensive and likely to warp out of shape. In good work the real door is of straight-grained white pine, which is "veneered" with thin hard wood, glued and screwed on.

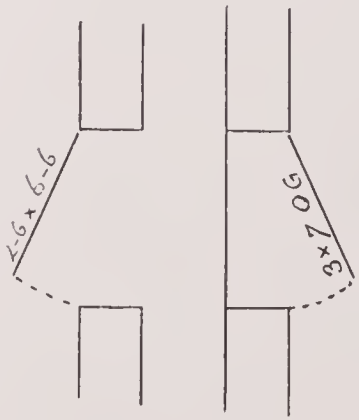


Fig. 13. Fig. 14.

"Batten doors" are cheap doors for outside cellar areas, etc., made of strips of narrow flooring nailed or screwed to cross pieces beneath, called battens. They should be of white pine where exposed to the weather.

On floor plans inside doors are shown, as in Fig. 13, by a simple opening of the proper width in the partition. For an outside door continue the outside line across the opening to designate the edge of the door sill, as in Fig. 14. It is well to draw a slant

line to represent the door and indicate to which side it is to be hinged, as shown. On this line write the size and quality of the door.

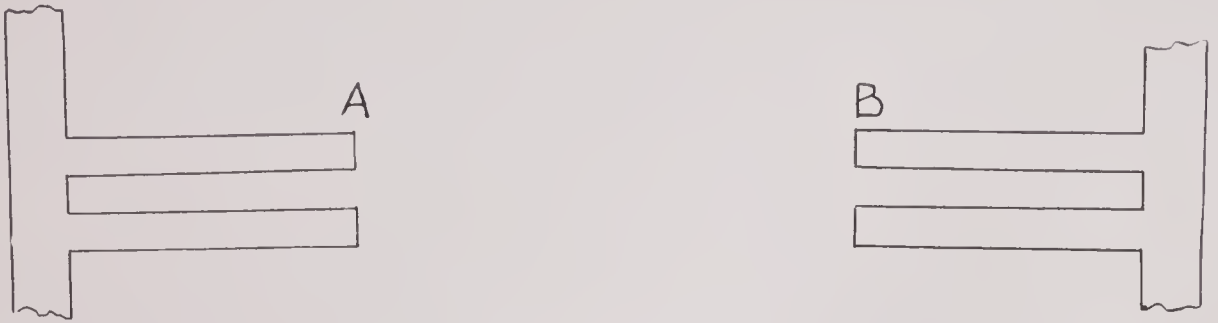


Fig. 15.

Sliding doors slide back between two partitions. They are drawn as in Fig. 15. The distance AB should be figured. Sliding door partitions are drawn twelve inches thick, ordinary partitions being six inches thick.

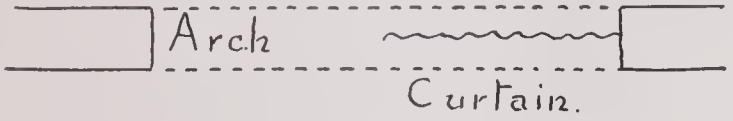


Fig. 16.

Sometimes a doorway is wanted with a curtain but no door, or with an arch over it, or with both arch and curtain. These are shown as in Fig. 16.

Fig. 17 shows the plan of a stair of which Fig. 18 is a side elevation and Fig. 19 a scale detail. In Fig. 17 A is the hand-rail, B is the newel post at the bottom, C is the "cylinder" (formerly called the "newel") and D is the quarter-turn where the hand-rail and the opening in the floor terminate with a "return" to the side wall. In the plans draw the hand-rail about three inches wide, and the newel five or six inches square. Rails, newels, balusters, etc., of great variety may be found in stock at planing mills or stair factories, or they may be made to order. In that case large scale details and full size drawings will be required.

In drawing the plan of a stair like that in Fig. 17 care must be taken to get ample "head-room" before making the return to the wall shown at D. In this case (not counting the winding steps indicated

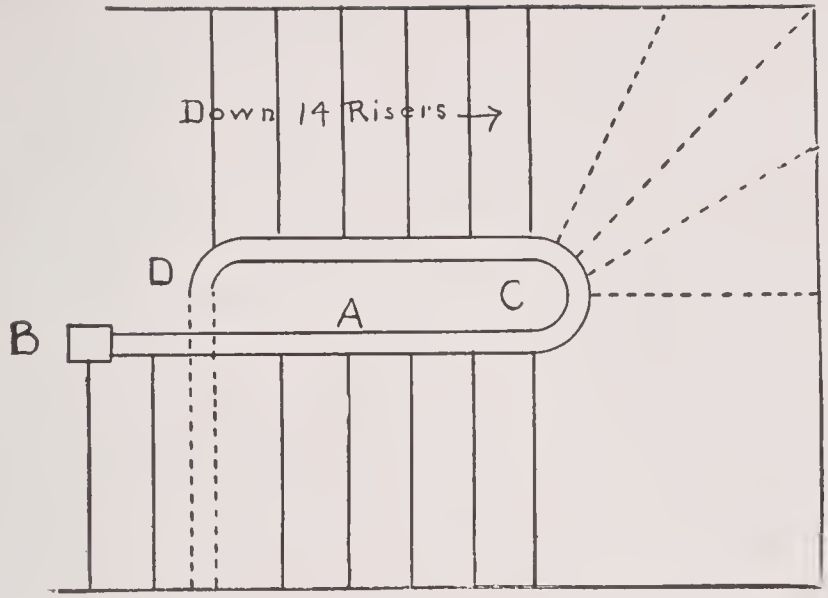


Fig. 17.

by dotted lines) the return comes at the outer edge of the eleventh tread. With a "riser" of seven and one-half inches each, the eleventh tread will be eighty-two and one-half inches below the upper floor. Deducting twelve inches for the floor thickness, this step is seventy and one-half inches below the ceiling, *i. e.* one and one-half inch less than six feet. This is a minimum head room. It would be better to carry the return two treads farther, so as to get a head room of fully seven feet. It will facilitate the stair builder's work to write on the plans the number of risers up or down in each stair. This stair is in two sections with a "platform" half way up. When winding steps are wanted they are drawn as shown by the dotted lines.

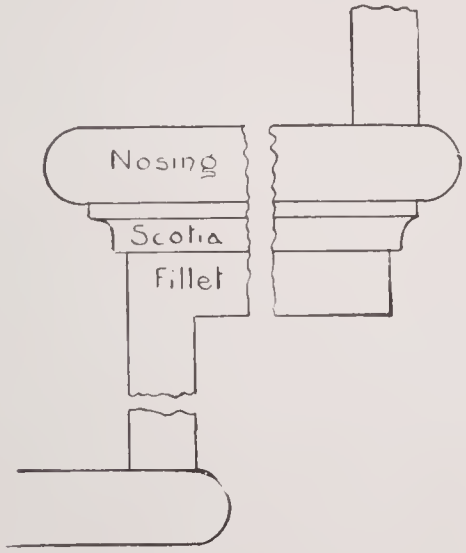


Fig. 19.

Figures 18 and 19 are chiefly to define the terms used by stair builders. In ordinary work it is not necessary to make such drawings, the plan of the stairs, with a proper explanation in the specification being sufficient. The terms "treads" and "risers" in stairs explain themselves. The edge of the tread is rounded to form a "nosing." Under it in good work is a hollow moulding called a "scotia." The nosing and

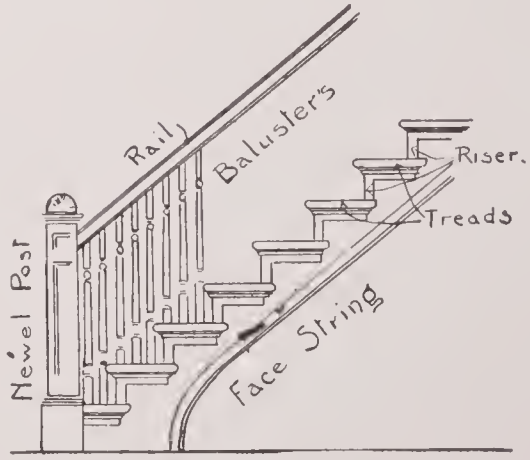


Fig. 18.

scotia are usually "returned," as it is called, across the end of the step, and below them a thin strip, called a "fillet," is added to cover and hide the joint between tread and riser and the "face string" which supports them.

Rear stairs often run up between two partitions and have no newel, rail or balusters, unless it be to guard the opening in the upper floor. Such are called "enclosed stairs." In distinction from enclosed stairs, the kind shown in Fig. 17 is called an "open flight with continued rail." It is customary to plaster the slant ceiling beneath the stairs. The wall ends of the steps are usually sunk into grooves cut in the "wall string." These are said to be "housed into the wall string." In very cheap work this "housing" is omitted.

In relation to the ease of ascent, a very good proportion for a stair is seven inches of riser to ten inches of tread. Many stairs have risers of seven and one-half inches with nine inch treads, and are found quite satisfactory. Rear stairs often have eight inch risers and eight inch treads. It is a mistake to make rear stairs too steep. Their purpose is largely to save the front stair and hall with their carpets, and if they are too steep the servants will improve every opportunity to use the front stair instead. Since the tread with its nosing projects beyond the riser below, a stair with ten inch treads "on the run," as it is called in planning stairs, will actually have a tread sightly wider than eleven inches.

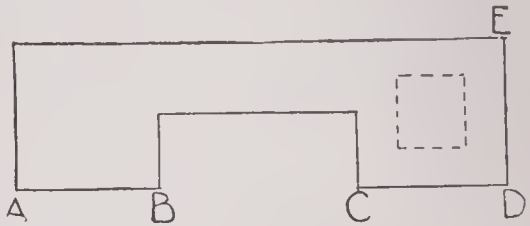


Fig. 20.

Fig. 20 shows a fire-place as usually drawn. The length is five feet, the breadth eighteen inches, and the central opening is two feet wide by nine inches deep. This leaves side piers, A B, C D, each eighteen inches wide, in each of which is space for a 9 x 9 flue to rise from below, if wanted. These dimensions answer for plans, although in fact when it is plastered the actual length of "breast," as it is called, may be one or two inches more than five feet.

A single flue is drawn eighteen inches square, a stack of two flues is 2½ feet long by 1½ feet wide, three flues are 3½ feet long, four flues 4½ feet long, etc., all by a width of eighteen inches. These figures are not always quite exact, since bricks and mortar joints vary, but they are all that is required in drawing plans. It is well to show in the plans in what rooms the flues are to have openings for

stove-pipes, etc. Sometimes a flue starts out from the wall near the ceiling, instead of running down to the floor. This is said to be "corbelled out," and is drawn with dotted lines like the side-flue shown in Fig. 24. There is danger from fire if corbelled flues are started too near the ceiling. Allow not less than twelve to eighteen inches between the stove-pipe hole and the ceiling, if of plaster. A wooden ceiling may need protection by a tin or other metal shield suspended below the ceiling and above the pipe.

Fig. 21 shows a common arrangement for a bath-room, with wood encased planished copper tub; a lavatory adjacent, with marble slab, and a modern water-closet in the corner. The round end of the tub is its head. The supply and discharge, or "waste" pipes, are usually at the foot of a bath-tub, and as these generally connect with the pipes to the lavatory and water-closet, it is advantageous to place the foot of the tub as near as possible to the other fixtures. Sometimes the water-closet stands between the tub and the basin, which is also a good arrangement. It is desirable to locate the water-closet, lavatory and the foot of the tub against an inside wall, if possible, as in Fig. 21, since the supply and waste pipes, which rise upon this wall from the lower story and basement, are more secure against frost than upon an outside wall. Sometimes a hot-air pipe or a smoke-flue can be brought up adjacent to the plumbing pipes, as an additional protection.

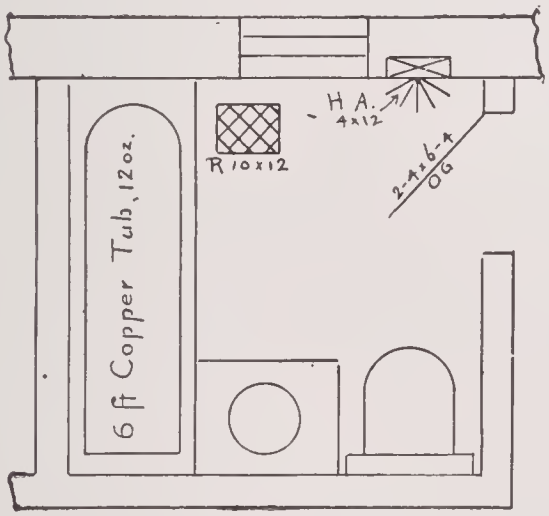


Fig. 21.

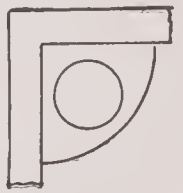


Fig. 22.

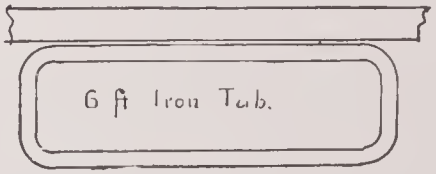


Fig. 23.

The old-fashioned copper-lined wooden bath-tubs are being supplanted by cast iron, or by porcelain, or other earthenware tubs which stand entirely free from the wall and from the floor, and have no casing whatever to harbor vermin or to conceal dirt and disease germs. Such a tub is indicated in Fig. 23. These tubs are in great variety of shape, size and ornamentation, as are also water-closets, lavatories, sinks, and other fixtures. There is no necessity, however, for attempting to make an accurate picture of the exact fixtures wanted. All that is required in

the plans is to use the diagrams shown, which are understood by all plumbers, and to give in the specification the more minute description necessary. But the general dimensions must be drawn with care in order to insure a sufficient allowance of room for the fixtures wanted.

Copper bath-tubs, New York pattern, are 24 inches wide and 19 inches deep, outside measure. French tubs are 26 inches wide and 22 inches deep. The New York tubs are in three lengths, viz: 5 feet, 5½ feet and 6 feet; the French tubs are 4½ feet, 5 feet, 5½ feet and 6 feet long. They are made of 10, 12, 14, 16, 18 and 20-ounce copper. The retail price of New York tubs runs from $15.00 for 10-ounce copper to $24.00 for the 20-ounce. French tubs are made of the same copper; their prices vary from $16.00 to $25.00 for the 4½-foot tubs and $22.00 to $31.00 for 6-foot tubs, of different weights of copper, with intermediate prices for the other sizes. The 12 and 14-ounce copper is heavy enough for ordinary uses.

Iron tubs are plain, painted, or "porcelain lined." They are of about the same sizes as above, and range in price from $18.00 to $112.00. Porcelain tubs of corresponding sizes cost from $120.00 to $270.00. These prices are increased in some cases by special fittings.

Plumbing supply houses now furnish lavatories complete, including porcelain bowls of great variety, plain and decorated, marble slabs and "backs," metal standards or brackets to support the bowl and slabs, and many kinds of faucets, etc. Such complete lavatories retail from $22.50 upward. In good work the marble slab should be "counter-sunk," *i. e.*, have a sloping surface sunk slightly below the rim, so as to drain water on the surface into the bowl, instead of its running off upon the floor, and the front edge of the slab should be moulded. "Square slabs" are made in ten sizes, from 18 x 24 inches to 20 x 33 inches. Corner slabs, as in Fig. 22, are in two sizes, 20 x 20 and 22 x 22. There are also cast iron lavatories, either painted, galvanized or enameled, made "half-circle" and "corner," with legs and without, and retailing from $4.50 to $11.50. These prices do not include faucets, plugs, chains, nor other fittings. There are also special forms and combinations, for schools, asylums, etc.

Lavatory basins are round, oblong and with straight backs, and the discharge opening at the back instead of the center. They are also made with "common overflow" and "patent overflow." The latter is a passage within the substance of the bowl for the overflow. It looks neater than the common

overflow, but is objectionable because its concealed passages are inaccessible for cleaning. There are also numerous patented overflows and wastes, some of which are admirable. Rubber plugs are preferable to those of metal. It is customary to protect the wall behind a lavatory with slabs of marble, to correspond with the lavatory slab. These wall-slabs are technically called "backs." They are usually made eight to ten inches high. It is also an excellent plan to place a countersunk marble slab under the water-closet. These should be 1¼ to 1½ inches thick and about two feet square. They cost $2.00 to $2.50 per square foot.

Until recently water-closets were very plain, and were enclosed in wood-work to hide their deformity. For sanitary reasons, such closets have been entirely abandoned in good work, the modern water-closet standing free and unconcealed; hence a great variety of shape and of ornament is to be found. A width must be allowed not less than two feet for any water-closet, and an equal projection from the wall out to the front of the seat and lid. There are now in use three general styles of water-closet, called respectively the hopper closet, the wash-out closet and syphon closet. The latter are again divided into the plain syphon and the syphon jet closets.

The hopper closet is the simplest, the cheapest, and in a sanitary respect one of the best, as it has no moving parts whatever to clog and get out of order, and every portion is directly visible and accessible for cleaning. But it is not thought to be as presentable in appearance as the others, and is used only in cheap work or for inferior positions in good buildings. It is made of cast iron and of porcelain, with or without self-rising seats, and costs, including supply-tank and chain, from $9.00 to $22.00 each.

Next comes the wash-out closet. This consists essentially of a shallow basin containing a very little water and a concealed trap, also a flush-tank. On opening the valve this tank suddenly discharges a large volume of water, with force enough to wash out all the contents of the closet into the concealed trap and partly through it. Wash-out closets are effective, but are apt to be noisy, and the trap is difficult of access for cleaning. Some wash-out closets are handsome pieces of furniture. Their price varies from $22.00 to $62.00, beside various extras for special fittings and accessories.

The syphon closets, like the other two classes above named, are free from moving parts, but they are more complicated than the hoppers or the wash-outs. They have a trap, with narrow passages so

arranged that the first discharge from the tank closes a syphon from the bowl, whose contents are thereupon drawn downward and off with great vigor through the energy of the syphon action. In the syphon jet closet, this syphonage is induced by a fine jet of water at the base of the closet. Syphon closets are considered the best in use. They cost from $41.50 up to $82.00, including seat and tank.

Kitchen plumbing is shown in Fig. 24, with sink and grooved drip-board in the corner, and a galvanized iron range boiler between the sink and the kitchen flue. As already remarked, the kitchen flue is dotted, to show that it does not begin at the floor, but is corbelled out from the wall near the ceiling, adjoining the laundry flue, marked L, which rises from below. The arrangement here shown of flue, boiler and sink, is one of the best possible for the satisfactory operation of all the fixtures.

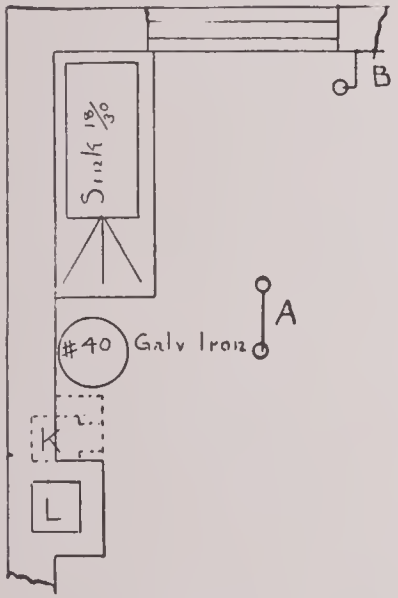


Fig. 24.

Kitchen sinks are of wrought steel, of cast iron (plain, galvanized and enameled), of soapstone, slate, and of earthenware, either coarse or fine. The iron sinks are most used. Twenty-two sizes of cast iron sinks are made, all six inches deep and ranging from 12 x 18 to 24 x 50. The 12 x 18 sink costs $1.25 for the plain iron, $2.60 for the galvanized and $4.75 for the enameled. A very good size is 18 x 30, costing $2.50, $5.10 and $8.50 for the three qualities respectively. There are other shapes, such as half-circle sinks, quarter-circle sinks, etc. Porcelain sinks are in four sizes, 20 x 30, 23 x 36, 24 x 42 and 24 x 48. They cost from $22.00 to $42.00 each. Soapstone sinks and slate sinks, of nearly the same sizes, cost $5.50 to $9.50 for slate and $8.50 to $14.50 for soapstone. Small pantry sinks are made of wrought steel, of copper and of porcelain. Steel sinks, 14 x 20 and 16 x 24, cost $3.50 to $4.75 each. Oval shapes, 14 x 20, may be had painted, galvanized, gray enameled and white enameled, at $2.00, $3.50, $5.50 and $6.50 respectively. Copper pantry sinks in six sizes, square and oval, from 12 x 20 to 16 x 30, cost from $5.00 to $12.00 each. Porcelain sinks in five sizes, from 14 x 20 to 20 x 30, cost $13.00 to $23.00. Cast iron sinks are also made with iron legs and backs, costing from $23.00 to $35.50; also, slate and soapstone sinks, with slate drip, metal legs, etc., from $13.00 up to $34.50.

The range "boiler," as it is commonly called, is in fact only a reservoir for water heated in the water-back or coil in the fire-box of the range. These boilers are made of galvanized wrought iron and of copper, in considerable variety of patterns. Fourteen sizes of iron boilers are made, from 18, 24, 30, 35, 40, 52 gallons, up to 196 gallons capacity. The sizes enumerated are most used for dwellings. They cost from $14.50 to $31.00 each, besides the cast iron stands, at $1.25 to $3.80. A forty-gallon copper boiler costs from $34.00 to $40.00; other sizes in proportion.

Fig. 25 shows a set of three laundry tubs. These are made of enameled iron, of porcelain, of glazed brown earthenware, of stone, and of slate or soapstone. Iron tubs, 24x24, cost $16.00 each; a set of two stone tubs, same size, costs $15.50; glazed brown earthen tubs cost $14.00 each; a set of two slate tubs of same size costs $20.00, and the same in soapstone costs $26.00. Fig. 25 also shows a grating and trap in the laundry floor, and the method of drawing the sewers.

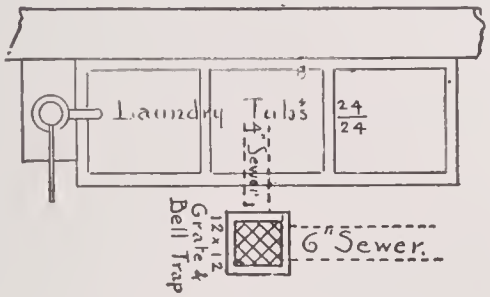


Fig. 25.

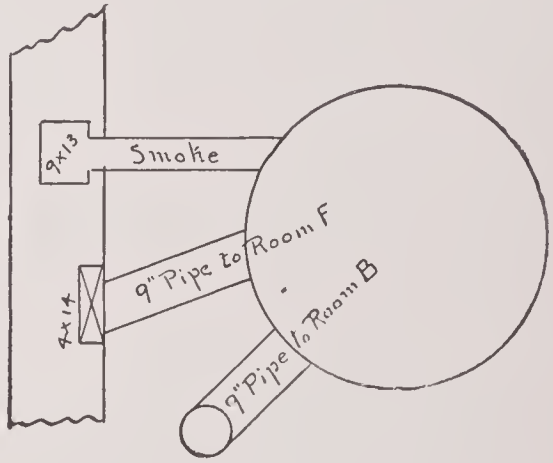


Fig. 26.

The prices for all plumbing are "list prices." Labor is not included, and no allowance is made for discounts on the one hand nor for extra fittings, of which there is a great variety, on the other.

Gas or electric lights are indicated as at A and B in Fig. 24, where A shows a "drop" from the ceiling for two lights, and B shows a "one-light bracket" against the side wall. The marks for lights are often made on plans in red ink.

A hot-air furnace and connections is shown in Fig. 26. Draw every pipe and show where it will enter the wall for rooms above the first floor, and where it will rise to floor registers, if any, in first story, giving in each case the diameter of the pipes and their destination, also showing the smoke-pipe and its flue. If the furnace is to be jacketed in galvanized iron, its shape will be as drawn. If it is to be encased in brick, its enclosure will be square, but it will not be necessary

to change the drawing. It will suffice to state in the specification that the furnace shall be encased in brick work.

Fig. 27 represents a front porch, or veranda, attached to the front wall of a frame dwelling. There is a step, one tread and two risers, up to the veranda floor, and another step at the front door.

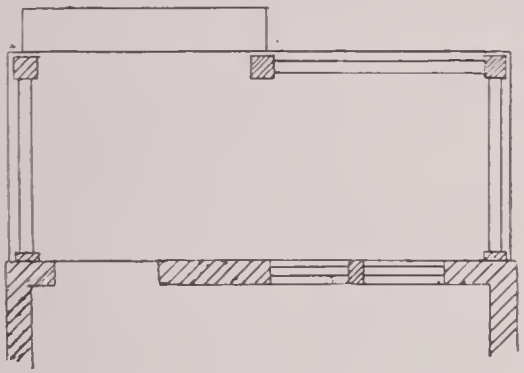


Fig. 27.

If these steps are each seven inches, and if the veranda floor slants, as it should, about one inch, the first floor will be twenty-two inches above the ground. With 2 x 10 floor joists and "seven-eighths" flooring, the under side of the joists will then be eleven and one-eighth inches above ground. A railing is shown between the posts, and two half-posts are shown against the building. The parlor has a mullion window in two parts. A good size for veranda posts is five to six inches square. They may be square and boxed, *i. e.*, hollow inside, or square and solid, or "turned" into round shapes, or partly square, partly turned. Large square posts, if solid, are apt to check and split in seasoning, even though a hole be bored longitudinally through them to prevent this. Large posts or columns are best made like a barrel, of narrow staves two inches thick screwed and glued together.

In ordinary brick dwellings, the walls are usually nine inches or thirteen inches thick. These are approximately their thickness when plastered. In some sections such are called eight and twelve-inch walls respectively (the plastering not being included). A nine (or eight) inch wall is also said to be "one brick thick," and a thirteen (or twelve) inch wall to be "one and one-half bricks thick." In estimating the number of bricks required, it is customary to allow fourteen bricks to the square foot of nine-inch wall and twenty-one bricks to the square foot of thirteen-inch wall. A substantial wall can not be erected of less thickness than one brick, or nine (eight) inches. Walls faced with "stock bricks" are usually not less than thirteen inches thick. Brick-work is paid for at an agreed price "per thousand in the wall." This includes mortar, labor, water, hauling and everything else necessary.

Walls of rubble stone masonry are generally used as foundations to brick walls, with a thickness of eighteen inches under a nine-inch brick wall, and twenty-one inches under a thirteen-inch brick wall.

These matters, and many others, are minutely detailed in the Building Ordinance of the City of St. Louis, to be had gratis. All houses within the city limits must conform to this ordinance. Rubble masonry in St. Louis is charged at a fixed price per perch of twenty-two cubic feet, including mortar, labor, and everything else necessary.

Inside stud partitions and the outside walls of frame houses are usually six inches thick, consisting of 2x4 "studs," plastered both sides, or plastered inside and "sided" without. If sheathed and sided, they will be about seven inches thick. Floor joists are ordinarily 2x10; ceiling joists, 2x4 or 2x6, and rafters 2x4, in houses of moderate cost. Within the "fire limits" in cities, the erection of frame buildings is forbidden, except on the petition of adjacent property owners and other conditions, to be learned on application to the city authorities. A building permit must be obtained, and there are often charges to be paid for using city water for building purposes, etc.; also regulations about the protection of the general public by lights, fences, temporary sidewalks, etc., and about depositing building material in the streets.

The weight of rubble masonry is taken at 150 pounds per cubic foot, the weight of brick-work at 112 to 125 pounds per cubic foot. Ordinary white pine lumber weighs about two pounds per foot, board measure, *i. e.*, one foot square and one inch thick. Yellow pine weighs three pounds per foot.

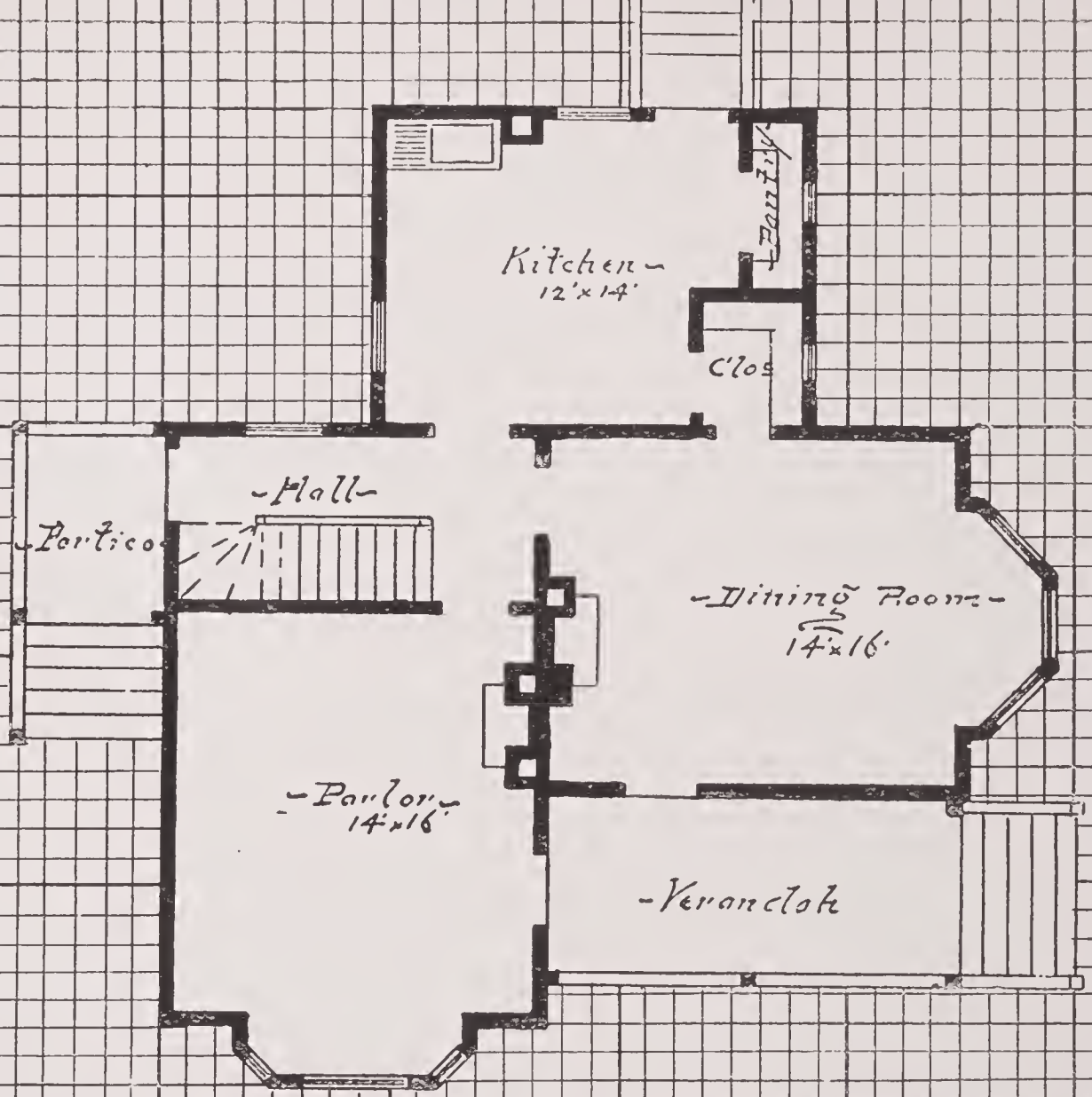
CHAPTER III.

PLANNING WITHOUT INSTRUMENTS.

HILE the purchase of a good set of drawing instruments is advised whenever it can be afforded, and the cost is not great, it is well for every one to know how, on occasion, to construct a fairly accurate house plan with no other instruments than a pencil and rubber. A ruler also will be of service, though not strictly necessary. Plate IV. shows how to do this with the aid of what is called "cross section paper," a finely calendered white paper, accurately ruled with heavy lines one inch apart, and at right angles to each other, so as to cover the paper with a series of squares measuring exactly one inch to a side. These squares are subdivided by lighter lines one-eighth of an inch apart, forming within each large square sixty-four smaller ones. Cross section paper is made expressly for the use of civil and railway engineers, and may be had of all dealers in engineering supplies.

It will be seen that to a quarter scale each of the large squares represents a block four feet square, while each of the smallest divisions represents a square of six inches on each side. Thus, a room twelve feet wide and sixteen feet long will cover a width of three of the large squares and a length of four of them. Therefore, with a soft pencil trace out on the cross section paper, along the heavy lines, a rectangle three large squares in width and four in length.

If this be a frame building, the outside wall may be traced along the first faint line beyond the diagram already drawn, for, as the faint lines are one-eighth inch apart, they represent a space, to a "quarter scale," just six inches wide.



FIRST FLOOR PLAN

CHAPTER IV.

DRAWING INSTRUMENTS.

RAWING instruments include the sets of dividers, compasses, ruling pens, etc., usually of Swiss, French or German manufacture, and put up in boxes, as shown on page 70, together with the drawing board, T square, triangles, scales, etc., which are sold separately.

The drawing board should be of seasoned straight-grained, clear 7/8-inch white pine, dressed both sides, perfectly straight, true and square, and with a 2-inch cleat at each end secured by dove-tailed grooves, but not glued nor nailed unless at the centre. The cleats should be a quarter inch shorter than the width of the board, to allow for shrinkage. A good size for a small board is 18x23 or 20x25 or 22x31 inches. Avoid hardwood for a drawing board; it costs more than pine, is heavier to handle, more apt to warp, and it is harder to press the thumb tacks into it.

Thumb tacks are for fastening the drawing paper on the board. For ordinary use take those with short, fine points well secured to the flat head. In very cheap tacks the point is insecure and apt to be pushed through the head and into the finger. A good and cheap German tack, called "Reise-brett-nagel," is stamped out of a single piece of metal, and is free from the above objection. Sometimes the drawing paper is moistened so as to expand it, then stretched and pasted at its edges to the board. In drying it shrinks tight like a drum head.

The T square, so called from its resemblance to the letter T, is used for drawing lines parallel or perpendicular to the edges of the drawing board. Lay the blade flat on the board with the head in the left hand, and slide the blade up and down the board keeping the head accurately pressed against the left edge of the board. Lines drawn along the upper edge of the blade in any of these positions will be parallel with each other and with the front and back edges of the board. They are also perpendicular (*i. e.*, "square") to the ends of the board. Now turn the T square across the board holding the

head pressed against its front edge, and slide the blade from left to right and back again. All lines drawn along the edge of the blade in the new positions will be parallel with each other and with the sides of the board. They will also be perpendicular to the first set of lines.

Some T squares are made with a split head, one-half of which is movable and can be set to any angle. The blade of the T square should rest on the head; it should not be sunk into it, as is sometimes done.

Triangles are of two kinds, the 45° triangle and the 30° or 60° triangle. In the former both acute angles are of 45° and the sides or "legs" enclosing the right angle are equal. In the other triangle one acute angle is of 30° while the other is of 60 and the "legs" are unequal. In each triangle the slant side, called the "hypothenuse," is the longest, and in the 30° (or 60°) triangle the shortest side is exactly half as long as the hypothenuse. Triangles are made of wood, rubber, celluloid, metal, paper, etc. A good size for ordinary use is one with legs 6 inches long.

Triangles are used for drawing angles of 30°, 45° and 60°, and for drawing parallels and perpendiculars to other lines, as follows: Let it be required to draw a line parallel with a given line AB, and one inch above it. Place either triangle so that one edge shall coincide with AB, then place a straight edge or the blade of the T square, or another triangle, accurately against some other edge of the first triangle. Now, holding the straight edge immovable, slide the triangle along it till the edge which coincided with AB is one inch above it, then draw a line along this edge; it will be parallel with the line AB. The triangle may be shifted to any number of new positions, and lines drawn along the same edge. If the straight edge remain unmoved all these lines will be parallel with AB.

Problem II. To draw through a given point C, a perpendicular to a given line AB. Place either triangle so that one of its legs shall coincide with AB; the other leg will then be perpendicular to AB. Now apply as before, a straight edge to the hypothenuse of the triangle, and, holding the straight edge immovable, slide the triangle along till the leg which in the first position was perpendicular to AB coincides with the point C. Now draw through C a line along this leg; it will be perpendicular to AB. If the straight edge be held unmoved, the triangle may be shifted to many other positions; every line drawn along the same edge will be perpendicular to AB.

Scales are indispensable in architectural work. They are made of wood, metal, celluloid, paper, etc., in great variety. A carpenter's two foot rule, divided into eighths and sixteenths of an inch answers all ordinary requirements. Paper scales are more accurate and more convenient in many respects, if kept clean. The scales most used for general drawing are the "eighth scale" and the "quarter scale," *i. e.*, one-eighth of an inch to the foot, and one-quarter inch to the foot. For details the "three-quarter" and the "inch and one-half scale" are much used, and a good deal of work is drawn "full size." The "three-quarter scale" is one-sixteenth of the full size; the "inch and one-half scale" is one-eighth the full size of the object.

The dividers, as their name implies, are for dividing or sub-dividing lines or spaces, and for transferring dimensions to a drawing from a scale or from another drawing. Learn to open and close them with one hand, without the aid of the other, and take care to keep the points straight and sharp and of the same length. Hair spring dividers have a screw adjustment which is delicate and exact, and is often of great service.

The compasses closely resemble the dividers, and may be used for the same purposes. But the "legs" are removable, and in their places may be inserted other "furniture," as the needle point, the pencil point, the pen, and the extension bar. All these are used in drawing circles or circular curves. It is customary to turn a full circle with one continuous sweep of the compasses.

For very small circles smaller instruments are made, called the "bow pencil" and the "bow pen." There are also small dividers controlled by a screw and called "spacers."

The ruling pen is for retracing in ink the lines previously drawn with the pencil. Hold it lightly in such a position that both blades bear alike on the paper and it will produce a firm black line of uniform thickness. The thickness of the line is varied instantly by the set screw, which is worked by the same hand which holds the pen. This is readily acquired by practice. When the points are dull they can be sharpened on a fine stone. Never allow ink to dry in the pen. Keep all drawing instruments perfectly clean.

In drawing papers Whatman's has long enjoyed a preference with architects as the best in the market. It comes in many different sizes of sheet, mounted and unmounted. As several copies of the

same set of drawings are generally required, it is customary to make "tracings" of the originals on transparent linen, called "tracing vellum," or on tracing paper. From these tracings "blue prints" may be obtained in any quantity by the aid of the sun. Black prints are also made from them, likewise blue lines on a white ground. There are also processes by which colored drawings can be duplicated in color without the intervention of tracings. The cost of making "blue prints" is about three cents per square foot.

India (or Chinese) ink is used in architectural drawing, as it gives a jet black line which is very durable. It comes in sticks of various sizes and prices. Some of these are scented, to conceal the otherwise offensive odor of the ink. The sticks are rubbed up in a saucer with a very little water to a consistency as thick as will flow freely from the drawing pen. There is also quite a variety of liquid inks, as Higgins', Winsor & Newton's, etc., which are very serviceable.

There are many special instruments which are of value to professional draftsmen, but are not required by amateurs. Their description may be found in the dealers' catalogues, with prices, etc.*

* A more detailed description of drawing instruments and their uses may be found in a book entitled "Drafting Instruments," by Prof. S. E. Warren, published by John Wiley's Sons, New York, and costing $1.25.

CHAPTER V.

PLANNING WITH INSTRUMENTS.

CHAPTER II gives a general description of dimensions and the conventional signs, etc., which are the "language" of house plans, and Chapter IV treats of ordinary drawing instruments, scales, etc., with their elementary uses. A few practical problems now require attention as preliminary to the actual operations of planning with instruments.

A house plan is not intended for a picture, to be hung on the wall: it is a *working drawing* for use in constructing the house. Hence, accuracy is the first requirement, and the problems which follow are to promote accuracy with pencil and pen.

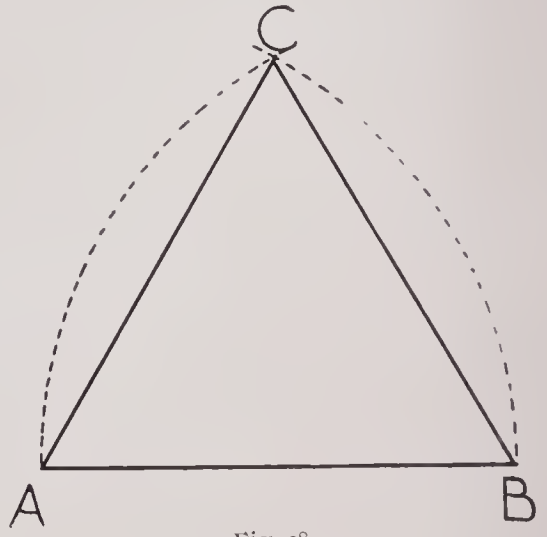


Fig. 28.

Problem I. Fig. 28. To draw an equilateral triangle on a given base AB.* Draw the base AB with the T square, and, keeping the blade parallel with AB, draw at A and B with the aid of the 60° triangle lines AC and BC. If the triangle is "true," and the lines are carefully drawn they will meet in a point C, such that AB, AC and BC will be equal. Test their equality with the dividers.

Should the triangle not be sufficiently accurate, a perfect equilateral triangle may be obtained with the compasses as follows: From A and B as centres, with the line AB as a radius, describe circular arcs to intersect as shown in a point C. Join AC and BC. ABC is the triangle required.

Problem II. Fig. 29. To draw a regular hexagon, each of whose sides shall be of a required

* An equilateral triangle has its three sides, and consequently its three angles equal. Each angle is of sixty degrees.

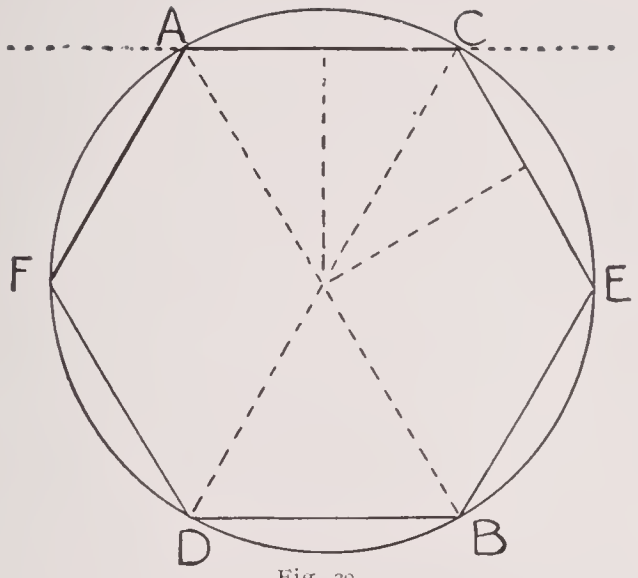


Fig. 29.

length AC.* Take the side AC for a radius in the compasses and draw a circle. Draw a diameter AB, and from each of its ends set off the distance AC in both directions, *i. e.*, at A set off the distance at AC and AF, and at B set it off at BD, BE. Join the six points so found by straight lines, as shown. Test these lines with the dividers; they must all be equal.

The sides AF and CE make angles of 120° with AC, and of 60° with AC extended right and left. Hence a regular hexagon may be drawn with the aid of the sixty degree triangle and the dividers, but not quite as readily as by the above method.

Problem III. Fig. 30. To draw a regular octagon.† To convert a square A B C D into a regular octagon draw the diagonals AC, BD. Take the half diagonal AE and at each corner set off this distance on each of the two sides which meet at that corner. This will give eight points on the sides of the square. Join them by straight lines; the result will be the octagon required. Test the equality of the lines with the dividers.

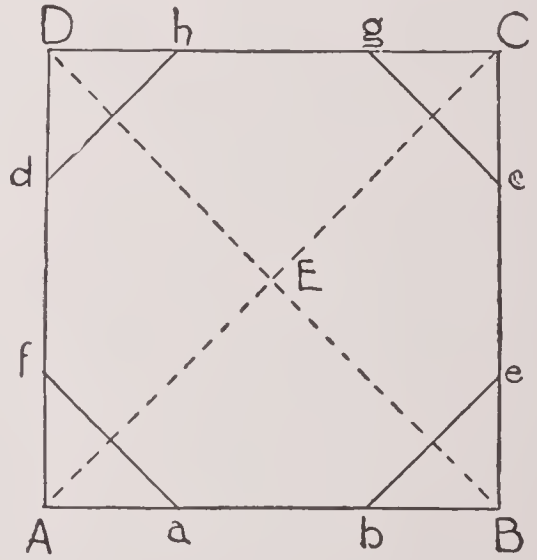


Fig. 30.

If it be required to draw a regular octagon with a given length to each side, the side of the corresponding square may be closely approximated thus: Multiply the given side by 2.41. If the 45° triangle is accurate the required octagon on a given side may be drawn directly with this triangle and the dividers, since every line is either parallel with the base, or at right angles to it or at an angle of 45° with it. This shape is much used for bay windows.

* A hexagon is a closed figure of six sides. If these sides are equal the figure is called a regular hexagon. The angles are also equal.
† A regular octagon is a closed figure with eight equal sides. Its eight angles are also equal.

Problem IV. Fig. 31. To draw a line making an exact angle of 45° with a given line AB. Extend the line as shown to any convenient distance BC, and on BC draw a square BCDE. The diagonals of this square make angles of 45° with its sides and base.

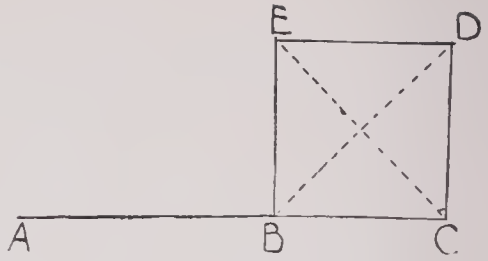


Fig. 31.

Problem V. Figs. 32, 33, 34. To find the centre of a square, rectangle, rhombus, etc. Any four-sided closed figure whose opposite sides are parallel, is a parallelogram. Its centre is at the intersection of its diagonals. A parallelogram whose sides and angles are all equal is a square. If the angles be equal, but the sides unequal, it is a rectangle. Fig. 32. If the sides are equal and the angles unequal, it is a rhombus. Fig. 33. The opposite sides of every parallelogram are equal, also the diagonally opposite angles.

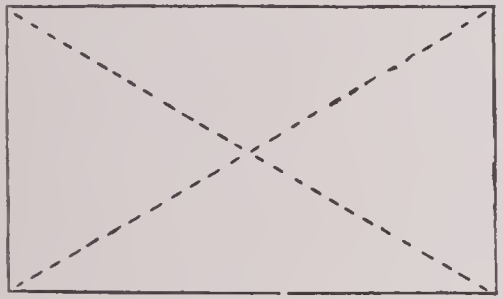


Fig. 32.

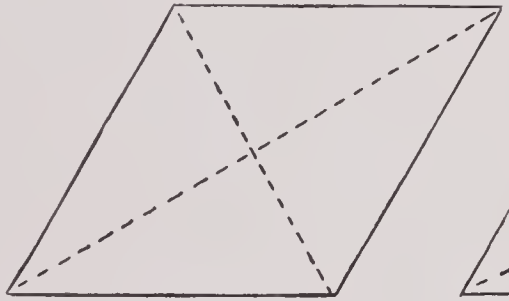


Fig. 33.

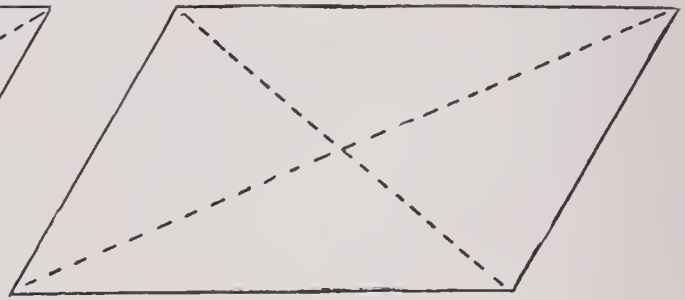


Fig. 34.

Problem VI. Fig. 35. To draw a circle through any three points as ABC. Join the points by straight lines, called "chords," and at the middle

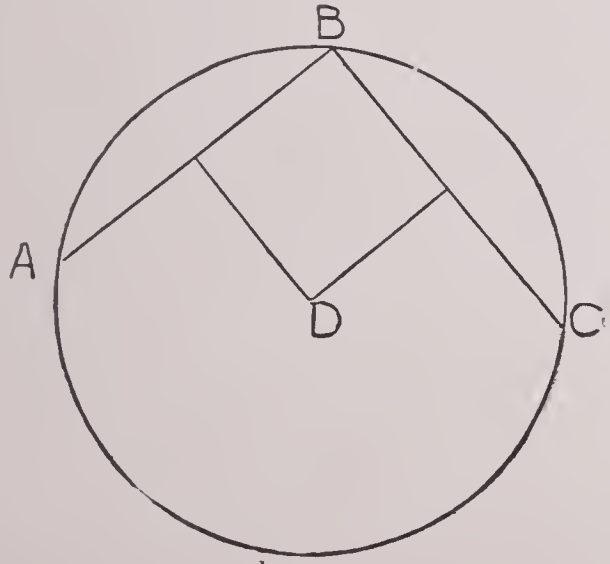


Fig. 35.

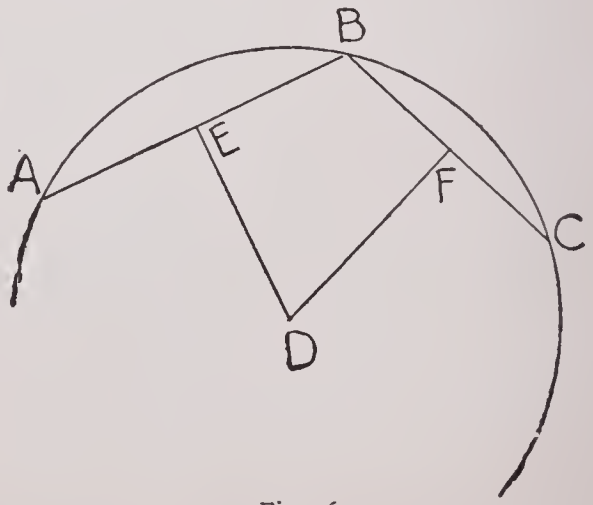


Fig. 36.

of each chord draw a perpendicular to it. These will meet in the centre of a circle which will pass through the given points.

Problem VII. Fig. 36. If a part of a circle is given, to find its centre and complete the circle. Join any three points as A B C on the given circle and proceed as in problem VI.

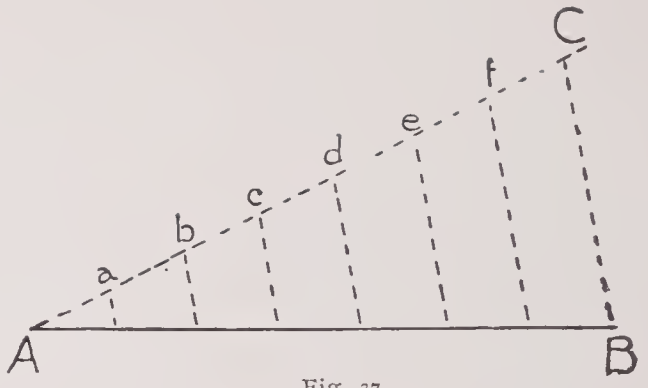


Fig. 37.

Problem VIII. Fig. 37. To divide a given line AB into a required number of equal parts. At either end of AB draw a line AC in any direction whatever, and on AC lay off any distance as many times as there are to be divisions in AB (in this case seven times). Join the last point C with B, and through each of the other points on AC draw parallels with BC. These will divide AB equally. This method is useful in planning stairs.

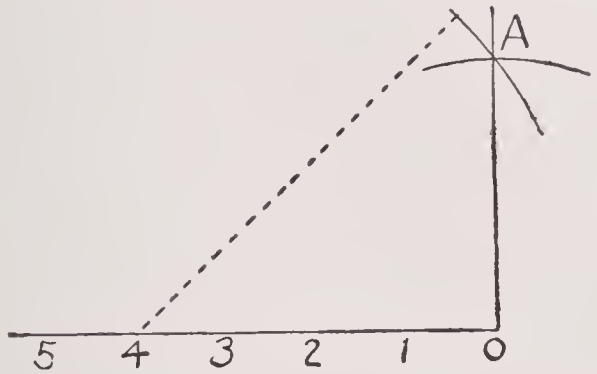


Fig. 38.

Problem IX. Fig. 38. To construct an exact right angle independently of T square and triangles. There is often a slight inaccuracy in drawing board, T square and triangles, so that when an exact right angle is required resort must be had to an independent method. On a given line lay off any convenient distance five times as at 1, 2, 3, 4, 5. With the point O as a centre and the distance O3 for a radius, draw a short circular arc. Then with the point 4 as a centre and the distance O5 as a radius draw another circular arc. From the point A, where these arcs cross draw a straight line AO. This is the line required to make an exact right angle, or angle of 90°, with the line O5.

A careful observance of these instructions, with those in Chapters II and IV, should enable the reader to plan an ordinary house with sufficient accuracy for practical purposes. Parties inexperienced in proportioning rooms, halls, verandas, etc., can readily correct this defect by observing and measuring the houses they occupy and others. In designing exteriors, a good rule for amateurs is to note and measure those which please them, also to analyze those which are not pleasing and find wherein the defects consist.

CHAPTER VI.

COLORING, LETTERING, FIGUREING, ETC.

HOUSE PLANS, when drawn, are colored to represent their material, as briefly indicated in Chapter II. Blue is used for stone, red for brick and yellow for wood. Iron may have a paler blue than stone, or it may have a tint of pale India ink. Concrete is shown by a blue tint filled with ink dots or "spatters." Glass is green, copper is a dark orange in color. Plastering is seldom colored, neutral tints may be used. For terra-cotta, use a brick red and section-line it, *i. e.*, cover it with cross lines moderately far apart.

For stone color, cobalt, indigo, ultramarine or Prussian blue are suitable. For brick, use India red, vermilion or carmine. For wood, use yellow ochre, burnt sienna or raw sienna. These are all "water colors," so called because in use they are mixed with water instead of oil. Water colors are sold by dealers in architects' supplies, drawing instruments, etc. They may be had in cakes and half-cakes, at prices from five cents each upward. They are prepared for use by rubbing them in a porcelain dish with a little clear water.

What are called "moist colors," of the consistency of thick jelly, are sold at about the same prices. They are in little porcelain pots, and are taken up as wanted on a wet brush. They are more convenient for use than the cake colors, and there is no loss from breakage and crumbling away. Neat japanned tin boxes are sold with an assortment of moist colors, and enameled trays and palettes for mixing them. These are cheap, compact and very serviceable.

There is also a variety of liquid colors in bottles, including liquid inks, as Higgins' ink, etc., which are much in demand

Water colors are used very thin, a single drop often being sufficient for a tablespoonful of water. So used, the white of the paper seems to shine through and illuminate them. Thick colors, on the contrary, are dull and uneven in appearance. The colors are applied with small camel's hair or sable brushes, costing from five cents apiece upward. Quill brushes are handled more conveniently if a

wooden handle is cut and slipped into the quill. All brushes and color dishes must be cleaned out after use, and the cake colors, including the India-ink sticks, must be wiped dry or they will crack to pieces.

In coloring a drawing, begin at the top with a brush moderately full of color, and bring the tint down by successive strokes of the point of the brush, taking care not to go back over a part already colored, since this would leave a cloud; also to leave the front edge of the color so wet as not to dry while replenishing the brush, to prevent a cloud at the juncture of successive washes. It is often advantageous to tilt the drawing board, by lifting the back edge so as to give it a decided slant forward. This facilitates the downward flow of the tint. The coloring must be uniform throughout, without brush marks or clouds, and without over-running the ink or pencil lines.

India-ink, being itself a water color, is apt to soften and run if a moist brush is passed over it too often. To avoid this, a drawing may be colored while in pencil and inked after the color is dry, or a special water-proof ink may be used. A dexterous colorist will often color an inked drawing without disturbing the ink lines at all, but this requires experience. Still another method sometimes practised is to ink the lines, then with a very wet sponge and abundance of clear water to wash off all the surplus ink. This requires dexterity, and is employed only on display drawings: it is not recommended for working plans.

The lettering and figuring of drawings is a very important matter. Except in titles, all display is to be avoided. The essentials of lettering are simplicity, neatness, quickness of execution, and, above all, perfect legibility. The various drawings and advertising pages in this book furnish many excellent examples of lettering, both plain and ornamental. A quite common fashion of the day is to imitate ancient Roman orthography in writing V and U alike (thus, HOVSE), and to select irregular, quaint styles of letters. This fancy may be indulged so long as it does not impair the legibility of the lettering and so lead to confusion.

In figuring drawings, as in lettering them, the first essentials are accuracy and legibility. Let each figure be of good size, and so completely and distinctly made as to preclude any possibility of its being mistaken for anything else, however much the drawings may become stained and soiled. It is a good plan to make a zero as nearly circular as possible; to carry the stems of the sevens and nines well

below the line, and the stems of the sixes as far above the line ; to make the figure four as it is made in type ; and to close the round head of the nines, not to leave it open so as to be mistaken for a careless figure seven.

There is also a method to be observed in arranging the figures on plans. The duodecimal system, *i. e.*, the system of feet and inches, is used in architectural work, although for engineering constructions the decimal system is generally preferred. A common practice is to designate feet by a single accent and inches by two accents, thus, 12′ 4″. A safer plan is to interpose a horizontal dash or hyphen between the feet and the inches, thus, 12′—4″. With this system, it is immaterial whether the accents are used or not. Where there are no inches use a zero, thus, 12—0. If a dimension is wholly in inches write it thus, 21″, to prevent the possibility of its being mistaken for two feet and one inch.

Outside dimensions are figured from "out to out," as it is called. Intermediate measures are best shown "to centres," *i. e.*, from the outside of the end wall to the centre of each opening, and to the centre of each intermediate wall or partition, etc. Dotted lines with arrow heads and crosses, all as shown in Fig. 28, indicate precisely the limits to which the figures relate. Every dimension should be figured clearly, as here shown, since drawings are subjected to rough usage on the building, and are apt to shrink and become distorted and obscured, so that scale measurements from them are unreliable. Moreover, workmen are more apt to be hasty or careless in taking scale measurement than the owner, consequently such work should not be left to them.

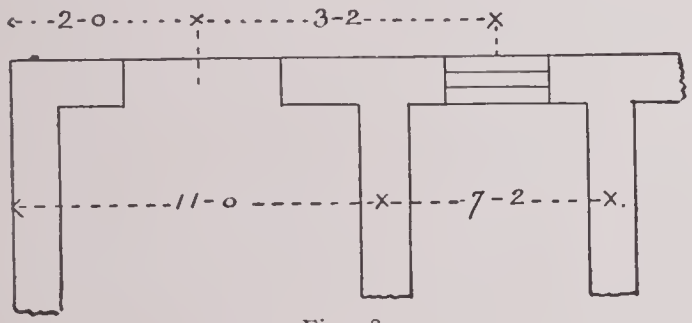


Fig. 28.

A carefully lettered and figured set of drawings greatly facilitates and expedites the task of house building, lessens the chances of mistakes, and very often results in a material saving in its actual cost.

CHAPTER VII.

SPECIFICATIONS.

FTER the drawings are as complete as possible a specification must be written, to explain the plans where necessary, and to give such additional information as may be required fully to describe the kind of house, the material, the construction, the mode of finishing, etc. Contractors are presumed to know nothing of these matters beyond what is shown in the drawings and specifications. Their bids will cover only what is found in these documents, and anything else is likely to be an "extra," which will be done only for extra pay, and often at a materially higher rate than is charged for the other work.

It is often advantageous to reserve some parts of the work to be furnished by the owner and set by him, such as the mantels, the heating apparatus and the lighting fixtures, or to be set by the contractor, as the door and sash locks, sliding-door hangers, sash lifts, bell pulls, and other "shelf hardware." The heating apparatus should be selected early, so that the house, with its flues, pipes, etc., may be built accordingly.

There are certain parts of a specification which are nearly the same for all houses of a similar character, and may therefore be embraced in a general specification, such as is given below. This must be supplemented by a special specification, covering all points omitted in the general specification, and varying more or less with every new house.

GENERAL SPECIFICATION.

SEC. 1—*The Owner*—The owner reserves the right to reject any or all bids, to insure the builder's risk till the work is done at the cost of the general contractor, and to order in writing any desired changes without invalidating the contract, a price for such changes to be mutually fixed in writing beforehand and added to the contract price or deducted from it as the change may require. In case of failure so to agree the matter

shall be referred to three arbitrators, chosen one by the owner, one by the contractor and the third by the other two. The decision of two of these arbitrators shall be final.

SEC. 2—*The General Contractor*—The general contractor will be responsible for the building from the date of his contract till its completion, and for all injury sustained in that time from whatever cause. He must lay out the work, give all lines and levels and see that they are properly observed. He must oversee and direct every part of the work, so that it shall be properly and promptly done and protected, must pay all fees for permits, licenses and other incidentals, and must protect the owner against liens and other damage by suitable bond or otherwise. He must keep on the work a responsible foreman to direct it in his own absence, and prevent all unauthorized lights and fires, and must keep the premises always free from nuisance and from unnecessary rubbish. He must deliver the building within the contract time, whole, sound and swept clean, and must promptly make good, without charge, any original defect discovered during the first month of occupancy, unless the same is clearly due to no fault of his. He must allow none but skilled mechanics on the work. No advantage shall be taken of real or supposed errors in the drawings or specifications, unless explicitly mentioned in the bid. Everything shown either in the drawings or specifications, or clearly implied by their plain intent, is to be furnished and done, unless stated otherwise in the bid. Figured dimensions will have precedence over scale measurements, and details over smaller drawings. The general contractor must make himself perfectly familiar at the start with all the drawings and specifications, so as to detect any misconception or error in advance. No allowance for real or supposed errors in the drawings or specifications, which by reasonable skill and care in the contractor might have been detected and corrected in advance. He must provide suitable sheds to receive and store materials and tools, also a temporary privy for the workmen, all as directed.

SEC. 3—*Sub-Contractors*—Sub-contractors must finish, deliver, care for and set up their work promptly and in the most skillful manner, without delaying any other contractor and so as to harmonize with the other work, as directed by the general contractor, and must clean up their own rubbish as soon as this can be done. They must take their dimensions by measuring the building itself, wherever practicable. They must read the general contractor's specification, and each sub-contractor must be responsible for his share of the duties, charges and liabilities of the general contractor, also for all acts by his own employes. Each sub-contractor must contribute, so far as concerns his trade, toward the excellence of the finished work and its speedy completion, according to the obvious intent of the drawings and specification. All materials must be new and of

the best quality of the kind named, and all must be finished and set up in the most substantial and workmanlike manner, to the satisfaction of the owner.

SEC. 5—*The Excavation* (read Sections 1, 2 and 3)—Excavate as on drawings for cellars, areas, trenches, posts, piers and other foundations, and as much deeper as may be necessary to reach below frost. All excavation to be plumb, straight and true, and kept free from standing water, as directed. When directed, fill around foundations with good earth, bank it up, water thoroughly and ram solid, and keep the same banked and rammed. Spread material excavated on the premises, or remove, as owner may direct. Where there is no cellar, the ground under the building should be raised above the adjacent land sufficiently to keep it always dry, but the earth beneath the first floor should not come within one foot of the bottoms of the joists. In case of rock excavation, or of filled ground, or other bad strata, a special agreement should be had with the owner as to the amount and cost of excavation ; also, for cisterns, privy vaults, sodding, filling, and other special earth work. The plumber will trench for his pipes and sewers.

SEC. 6—*The Stone and Brickwork* (read Sections 1, 2 and 3)—Stone foundations, walls, piers, and all other stone masonry will be first-class rubble of the best local building stone, with suitable stone footings laid to a line, both sides straight, plumb and true, and bonded in the best manner, carefully pointed outside and inside and leveled off and capped with large flat stones at the proper height for the superstructure, as drawn. Above ground face all visible walls with selected stone of good size, shape and color. Finish all openings with large stones dressed to fit the wooden frames. Provide 4-inch stone footings to all walls and piers not shown otherwise ; these must project entirely without the walls not less than 4 inches. All masonry must be carried up together. Where there is no cellar, leave holes as directed to ventilate below first floor. Carry all foundations to the depths shown on drawings, and as much lower as may be necessary to go below frost line.

Lay all the above in mortar of the best local lime and clean, sharp sand, mixed in a box and so made as to produce the strongest and best mortar, and fill all spaces solid with mortar and spalls. Pit sand should be screened carefully.

SEC. 7—*Brickwork* (read Sections 1, 2 and 3—The best quality of merchantable brick will be used above the level of the first floor, and the best hard red brick below, unless otherwise shown or agreed, all laid in the best local lime and sand mortar, as in Section 6, the facings to be of the best selected brick, all bricks sprinkled clean and laid wet (except in freezing weather), each five courses to be not over 13 inches high,

4-inch trimmer arches to all fire-places, and hearths to same of best selected red bricks, laid dry and bedded in the best manner (unless shown otherwise), approved arches over all openings, all walls carried up together, no toothing, every sixth-course headers slushed, all joints filled with mortar and neatly struck, except where to be plastered. The general contractor will set frames, but the bricklayer must wall them in solid and plumb, and must insert as directed wooden plugs, anchors, hot air flues, etc., furnished by the general contractor. All flues must be stuck smooth inside, not pargetted, and all withs must be built and bonded into chimney walls as they go up, not set in afterward. Procure from the tinner suitable strips of painted tin, and insert them as directed in the joints for counter flashings to the roof, etc.

SEC. 8—*The Carpenter Work* (read Sections 1, 2 and 3)—Usually the carpenter is also the general contractor, and he will be so considered unless otherwise stated herein. All lumber not shown otherwise will be sound, merchantable second quality white or yellow pine, as agreed, as dry and as well seasoned as the local market affords, the joists gauged, crowned and jointed (and in brick buildings beveled 3 inches at ends and resting not less than 4 inches on the walls), all joists and rafters in one length across the building when not over 18 feet long, unless shown otherwise. All studding 2 x 4, unless shown otherwise, the joists and studs 16 inches from centres, the rafters 20 inches from centres, double joists under partitions, the wall studs to frame building to be in one length from sill to roof plate, unless spliced in gable ends. Frame double trimmers and headers around fire-places (and prepare for trimmer arches), also for chimneys, stairs and other openings; no timber to enter a flue for any reason, nor to come within one inch of it. Securely cover with tin or slate the side of all timber adjacent to any flue. Frame veranda floors with a slant of 1 inch to 6 feet, to shed water. In the mid-height of all stud partitions, and in each floor of 14 feet span or less, provide one row 1½ x 2½ bridging, securely nailed at both ends of each piece with two ten-penny nails, and add one additional row of bridging for every 5-foot additional span. Anchor all joists to brick walls by approved wrought iron joist anchors about 8 feet apart. All framing to be with tenon and tusk.

Inside studs must not stand on the joists, but must pass between them where possible and stand on the sill, or plate, or wall below. Plates to be two layers 1 x 4, unless shown otherwise, breaking joints. Upper floors to frame buildings will stand on 1 x 4 girt, let flush into inside face of stud and well nailed. The walls of frame buildings must be stiffened with diagonal bracing at all corners in the best manner, as directed. Put up boards and other supports necessary for plumbing work, and cut and patch for all other trades, as directed. All framing must be accurately cut and fitted, and all nailed and spiked and secured in the most

substantial and workmanlike manner. Studs must be doubled at corners and all openings. Truss all door and window heads in the most substantial manner. (See detailed provisions of special specifications hereto attached.)

SEC. 9—*Roofs, Sheathing, Siding, Furring, etc.*—Cover all roofs and outside walls with good seasoned white pine undressed sheathing, free from shakes, cups, rot and large knots or holes, cut square at ends, laid close joints, secured with two ten-penny nails to each stud and rafter, no board over 10 inches wide and all to break joints, as directed in each course. Over this on walls and roofs lay one thickness of best sheathing felt, or equivalent, well nailed and lapped 1 inch at all joints. Cover all roofs, including dormer sides and roofs, with best *A* white pine sawed shingles, 3 to 7 inches wide, laid 5 inches to the weather; the eaves and ridges double coursed, hips carefully mitered, valleys open 6 inches in the clear. Tin valley linings must be laid and painted before shingling, and the carpenter must provide and shingle in approved flashings of painted tin around chimneys, and all other vertical surfaces, and cover the same securely with the counter flashings inserted by bricklayer, as in Section 7. Guarantee all roofs 12 months. On all outside walls, not shown otherwise, lay second common white pine siding, 4½ inches to the weather. Ceil all verandas and porches, not shown otherwise, with ⅝ matched yellow pine ceiling, 3-inch count, all strips in one length, no cross joint, also the planciers to all eaves and gables.

Outside casings and corner boards to be 1⅛ x 4½, unless shown otherwise.

See details for cornices, porches, dormers, canopies and gables. All outside trim to be dry, seasoned second clear white pine, unless shown otherwise. Fur as necessary for plaster arches, etc.

SEC. 10—*Floors and Wainscot*—All flooring to be matched, tongued and grooved, mill-dressed second rate ⅞ white pine or select yellow pine 4-inch count or under, as dry as the market affords, secret-nailed and hand-smoothed afterward in the best manner. Hardwood floors should not be laid before plastering is done. Around all hearths cut in a hardwood border. All veranda and other outside flooring must be 1⅛ white pine, all strips in one length without cross joints in outside floors and in all wainscot and outside ceilings.

All wainscot not shown otherwise will be 3 feet high of the same material and widths as the inside flooring and neatly capped, to be securely nailed at its top, middle and base to suitable grounds. All wooden ceiling to be ⅝ white or yellow pine, tongued and grooved 4-inch count and under, of same quality as the flooring. For inch partitions use flooring as above, dressed both sides. See detailed provisions of special specifications hereto attached.

SEC. 11—*Doors, Windows and Blinds*—All doors and jambs and all sashes, blinds and casings must be second clear white pine, unless shown otherwise, hand-dressed smooth. Doors thicker than 1¾ inch must be in two thicknesses glued and screwed together. Provide ⅞ jambs with moulded rebate strip nailed on or 1⅜ rebated jambs to all doors, all jambs wider than 8 inches to be neatly reeded or paneled, closet jambs not over 6 inches wide may be single rebated; all others double rebated, transom sash of same thickness as door where marked T. L. on plans, to be hinged or pivoted as directed, and to have moulded bar. All doors not shown otherwise will be four panel 1⅛ solid mould raised panel, all with suitable hardwood thresholds. To outside cellar steps not shown otherwise provide batten doors of white pine flooring same as in Section 10, put together with screws or wrought nails, and securely fastened inside.

Cellar and attic windows will have 1⅜ dressed plank frames and 1⅛ swinging sash unless shown otherwise; box frames elsewhere with hardwood pulley stiles and strips, best turned axle pulleys, best American sash cord, 1⅜ lip moulded sash, framed, wedged and pinned in the best manner. Outside blinds, if ordered, should be 1⅛ to 1⅜ thick, half rolling. See detailed provisions of special specifications hereto attached.

SEC. 12. In closets, and wherever not shown otherwise, provide single member 4-inch flat casings and 6-inch beveled base with quarter round, all with butt joints, no miters. To windows not shown otherwise provide 1⅛ moulded stool and apron. Case kitchen sink in dressed stuff with hardwood grooved drip as directed. All shelving to be ⅞ C select white pine, or poplar of equivalent quality, dressed both sides. Protect plaster corners with 1¾-inch turned bead. The cap to bath tubs and the trim to water closets and hand basins are furnished by the plumber. All inside trim must be hand-finished smooth. See detailed provisions of special specifications hereto attached. For panel backs, chair rail, picture mould, cedar closets, fencing, wooden mantels, tile hearths, etc., see below.

SEC. 13—*The Hardware*—The owner will furnish on order from the builder and at his risk all outside door bell pulls, all door and sash locks, lifts and bolts, transom workers, blind hinges and fasteners and wardrobe hooks, to be put on by the builder, who will furnish at his own expense and put on all other hardware complete. Fit the door locks, then remove and replace after the painting is done. Provide rubber tipped turned base knobs to all doors opening against plaster. Provide T or strap hinges and suitable fastening to cellar way batten doors. For sliding door hangers, bronze hinges, hardware and other specialties, see below.

SEC. 14—*The Stair Work* (see Sections 1, 2 and 3)—Inside stairs will have 1⅛ yellow pine treads,

⅞ risers of white or yellow pine, as preferred, firmly supported on 2-inch plank carriages at both ends and middles, the treads tongued and grooved into risers, the steps housed into wall strings, wedged up, glued and nailed in the most substantial and workmanlike manner, to have return nosings, scotia and fillet on face string, which will be 1⅛ inches thick, rebated and beaded as shown, the wall string moulded to match base. Cover the treads with boards as soon as up, for protection. Outside steps to correspond with the above, but to be of white pine well supported on good cedar posts firmly set and sunk below frost, the steps to have return nosings, no scotia. Cellar stairs to have treads as above, no risers, and a good pine or poplar dressed rail and post. See detailed provisions of special specifications hereto attached.

Sec. 15—*The Plaster Work* (see Sections 1, 2 and 3)—Lath all ceilings, studding, furring, and underside all stairs, except to cellar, with the best seasoned white pine lath, ⅜-inch spaces, breaking joints every eighth lath, no bark, resin nor other defect. Plaster throughout with best three-coat laid off work, plaster paris or sand finish as directed. Finish straight, true and smooth without cracks, pits or other fault. Run the brown coat down to the floors everywhere. No plastering in attic nor below first floor unless shown otherwise. No plaster mixed on the floors nor placed there for any purpose. Mix plaster mortar in a box ten days or more before use, all to be of the best local lime, screened sand and sound clean winter hair in such proportions as to produce the best plaster, the lime to be run through a sieve. Brick work brushed clean, sprinkled and plastered while wet. Allow for heating in cold weather, and guarantee all plaster from freezing. Patch after the other trades, as directed. See detailed and special specifications hereto attached.

Sec. 16—*The Metal Work* (see Sections 1, 2 and 3). Unless shown otherwise all tin roofing, flashings, counter flashings and tin linings to valleys and gutters, also tin speaking tubes and rainwater conductors and valves, will be of I. C. leaded plate, and all hot-air tubes of I. C. bright charcoal tin plate, all put up with properly locked and soldered seams in the most substantial and most workmanlike manner—all to have one heavy coat of paint underside before laid and another coat on top by tinner as soon as laid. Provide the bricklayer with suitable zinc or painted tin counter flashings to be built into chimney tops, etc., at the roof line, and furnish suitable flashings of the same for the carpenter to shingle in with his roofs. Run gutters up under the shingles two inches above the front line of the gutter and provide suitable conductors with all necessary elbows, all of I. C. tin. Test the slope of wooden gutters before lining them, to insure a proper construction. Fasten hanging gutters with good straps of the same material every three feet, and fasten conductors securely every five feet high. Provide sheet iron thimbles and tin covers to flue holes, to be set

and plastered in by the plasterer. Plug the ends of speaking tubes till plastering is done, then solder on approved tin mouthpieces and whistles. Valley lining to shingle roofs to be 14 inches wide to all valleys unless shown otherwise. For galvanized ironwork, hot-air tubes, furnaces, skylights, etc., see below.

SEC. 17—*The Plumber's Work* (see Sections 1, 2 and 3)—Provide fixtures, as shown, in complete working order, with all necessary and customary faucets, traps, plugs, connections and fittings. All wastes to have suitable lead trap and brass clean-out screw.

Rubber plugs to hand basins, suitable air chambers where Fuller faucets are used, all plumbing to comply with local health and other ordinances; all pipes to be lead unless shown otherwise. No joists to be cut farther than 18 inches from their supports, all cutting and patching of the woodwork to be done by the carpenter, who will also provide, as directed, suitable strips to support all plumbing. Fill copper-lined baths with clean shavings as soon as set, for protection. Soil pipe joints must be run with melted lead on a hemp gasket and calked tight, as required, to be well tarred inside and outside before set up, the line of soil pipe to rise through the roof with a water-tight lead joint and rise to the level of the ridge of the highest roof. All connections to be through Y or T branches with brass or copper ferrules calked tight, as above, with melted lead. All pipes tested per city ordinance, where so required, and all plumbing, sewers, etc., to conform to same.

Lay drains of best vitrified salt-glazed earthenware to drain cellars as soon as excavated, and connect with rain-water conductors as soon as the roofs are on; all sewers laid with proper uniform fall, 12 inches or more below the cellar floor, where there is a cellar, and not less than 2 feet deep elsewhere, all connections and bends to be with suitable curves or Y and T branches, each section bedded solid for its whole length, all joints under the house wetted and filled with equal parts best hydraulic cement and the finest sand obtainable. The plumber will dig the trenches for his sewers, and when laid will fill them again, bank up, water and ram till they remain filled.

SEC. 18—*The Painter's and Glazier's Work* (see Sections 1, 2 and 3)—Use pure linseed oil, strictly pure white lead and the best colors throughout, all to be well and evenly laid on. Paint all stairs and steps and all other dressed woodwork inside and outside, except inside floors, three coats lead and oil as above and of such tint as the owner may select, all knots and pitch properly shellacked, and nail holes and cracks puttied properly after priming, all work cleaned by the painter, sandpapered smooth and properly prepared for painting. Prime exterior work as early as possible, but not in wet weather. No paints stored

nor mixed in the house, and no blinds or other loose work painted inside the house unless in the cellar. The painter will be held responsible for all soiling of floors, plaster and other work by his employes or by himself.

Glaze all sash not shown otherwise with good clear Pittsburg glass. In windows to bath-rooms use obscured enameled fancy pattern glass. All glass to be perfectly bedded, bradded and back-puttied and left whole and clean on completion of the building.

SEC. 19—*Electric Work*—Wire for electric lights as drawn, using Okonite or Grimshaw wires, all drops to work by wall switches, brackets worked by key on fixture. Owner will furnish and set all switches. Provide substantial grounds at all outlets to fasten fixtures and switches to. Consult owner as to point where wires shall enter building and location of meter, cut-outs, etc. Leave all ends six inches long at outlets. All wires to be concealed, and to be enclosed in best safety tubing in passing through walls and wherever necessary elsewhere. Locate cut-outs in wall pockets provided by owner. The wires to be copper, commercially pure, of 95% conductivity and first-class insulation, balanced so as to insure equal efficiency to every lamp in any circuit under all circumstances, the loss of power in wiring not to exceed two per cent. with full number of lamps in circuit. Allow not more than ten lamps on one circuit. The entire work to be first-class in all respects, open to inspection, and in compliance with the regulations of the local electric light company and the local board of fire underwriters. *

* This General Specification is substantially the same which the author has used in his practice for many years. It is believed to be the most practical and most complete General Specification ever printed.

CHAPTER VIII.

ESTIMATING THE COST.

HERE is no way of determining precisely the cost of a house in advance. This is affected by so many contingencies, such as the weather, fluctuations in the prices of labor and materials, and by accidents and delays from a multitude of unforeseen and unforeseeable causes, that not even the most experienced contractor can tell in advance just what a house will cost. He may agree to build it for a certain price, and, if there are no extras, this price may be the cost to the owner of the house, but the actual cost to the builder cannot be determined till it is done, and all accounts are settled. Even then it is often not exactly known.

Nevertheless there are several methods of approximating the cost in advance, which practical men employ, and a competent architect of experience can often give "off hand" as close an estimate, without any figuring, as can be had in any other way. The temptation is strong to under-estimate the cost in advance, with a moral certainty of a more or less severe disappointment afterwards, and owners often exert a pressure upon an architect to make a low estimate against his better judgment.

A quite safe mode of estimating the cost of a house is to ascertain its contents in cubic feet (including cellar and attic), then to find a house of similar character whose cost is known, ascertain what this cost was per cubic foot, and multiply this figure into the number of cubic feet in the proposed house. Even then a margin of ten per cent is advisable for contingencies. For ordinary frame dwellings, eight to ten cents a cubic foot is a fair average price, but subject to local variations. For brick houses, estimate ten to twelve cents per cubic foot.

A shorter and simpler method, though less reliable, is to find the cost of a similar house per square foot of floor space, and multiply this by the aggregate floor space of the new house.

It has often been found that the total cost of an ordinary brick dwelling is about five times the cost of the brick work, *i. e.*, if the brick work complete costs six hundred dollars, the house itself will cost three thousand dollars.

In preparing bids for the erection of a house, careful contractors "take off the quantities," as it is called, from the drawings; *i. e.*, they figure up the amount of earth excavation, of stone work, brick work, iron work, etc., etc., and of the labor. Then they multiply these various quantities by the ruling prices for each, and, adding a suitable margin for profits and for contingencies, they complete their bids. This is the most reliable of all methods, but it is too complicated, and requires too much practical knowledge and experience for amateurs to undertake it, or even to understand it.

As illustrating the relative proportions of the leading items of cost in a house, the following estimate is given in detail for a seven-room frame house with brick foundation:

Excavation	$ 32 00
Brick work and footings	350 00
Lumber and base	710 00
Twenty-three doors and twenty-four windows	480 00
Two mantels and grates	60 00
Stairs	72 00
Nails, etc	40 00
Plastering	300 00
Tin work	60 00
Paint and glass	175 00
Plumbing and gas	300 00
Furnace, etc	130 00
Labor not included in above	300 00
Incidentals	200 00
	$3,209 00

CHAPTER IX.

TAKING BIDS AND LETTING CONTRACTS.

HEN the drawings and specifications are done it is customary to invite bids from several contractors for the erection of the building. This is partly to secure lower prices than can be had without competition, partly to guard against mistake. If bids are nearly alike the lowest may generally be accepted with safety ; but a bid which is far below all the others is to be suspected as erroneous and should not be accepted without investigation. Mutual good faith is of prime importance in house building. No honorable contractor will take advantage of a confiding owner to charge more than a fair price for his work, and no owner, in turn, will take advantage of a contractor, who has inadvertently figured a job too low, and endeavor by legal forms to extort work from him at less than cost. Schemes to get value without returning a just equivalent are as sure to end badly in house building as in other enterprises. A fair price for the work and honest work for the price should be the rule on both sides.

It is advisable to invite only those bidders whose services are wanted and then to accept the lowest tender, reserving the right, however, to reject any or all bids. The owner should not ask a bid from any one to whom he would be unwilling to entrust the work, should his bid be the lowest. A contractor's time is valuable to him, and, when he devotes that time and skill to making a bid for work, it is on the implied but no less valid understanding that, if his bid is lowest, he will be awarded the contract. The owner is free to invite competitive bids or not, and he may give his work to one party exclusively or he may ask a dozen to bid on it, all without blame ; but, having invited and obtained bids, he is morally bound to award the work to the lowest invited bidder.

A few addresses of responsible contractors are given at the close of this chapter.

Bids should be substantially as follows:

EDEN, January 1st, 1894.

TO MR. ADAM, SR.,

Dear Sir—I (or we) will furnish all materials and labor and will erect and complete your house on A street, in this city, according to plans and specifications for the sum of One Thousand Dollars ($1,000.00).

A. B. BLANK, Builder,
1728 A street, City.

To prevent mistakes the price should be stated both in figures and in words.

Bids and contracts are made "according to the plans and specifications." This means that the materials and labor called for in the plans and specifications are to be furnished—nothing more and nothing different. The contractors are not presumed to know the owner's wishes except so far as the plans and specifications describe them. Hence if another door is wanted, or a window, or if a larger door or window is preferred or anything else different from what the plans and specifications contain, it will be charged as an "*extra*," and very often at a higher rate than the contract price. If anything is omitted the contractor should make a fair deduction from his bid therefor; but it is seldom that the same price is allowed for omissions which is charged for "extras." In this way disputes often arise between owners and contractors, which might have been avoided had the plans and specifications been sufficiently complete at the first.

If changes are wanted a fixed price should be agreed on in advance with the contractor for the same and a written memorandum made in duplicate. In default of this it may sometimes be arranged that the builder shall charge actual cost of material for the change and a fixed sum per diem for the labor. The price of such work is apt to be higher than owners expect, however.

Drawings, specifications, contracts, etc., should be in duplicate or in triplicate, one copy to be retained by the owner. No marks, erasures nor other changes of any kind should be made in these drawings or specifications after the work is contracted for without a written agreement with the contractor. Even then it is often advisable to make additional drawings and specifications for all changes,

so that the reliability of the original records may be unquestioned. Another method is to mark on the drawings the changes with their date in red ink without erasing the original lines or figures.

Good faith is no less obligatory on contractors than on owners. This forbids their taking unfair advantage of obvious omissions or other faults in the drawings or specifications, and requires prompt notice of any mistakes they may think they have discovered, in order to an explanation or correction by the owner. If a feature shown in the drawings is not mentioned in the specification, this fact does not relieve the contractor. The drawing is evidence enough of the owner's intent, and the contractor's duty is to include it in his bid, or, if in doubt, to refer the matter at once to the owner for explanation. Obviously the same rule applies to matters found in the specification but not in the drawings. It is likewise the contractor's duty to watch the work and the plans and specifications diligently in order to detect inaccuracies, should they exist, promptly and before serious consequences result.

Sometimes all bids exceed the owner's limit and a change is necessary in the plans so as to reduce the cost; or there may be other reasons for making changes before closing the contract. It is the custom among contractors to leave such matters to be adjusted by the owner and the lowest bidder, instead of having them all bid anew.

Contracts should be in duplicate or triplicate, signed and attested before witnesses, one copy to be retained by the owner. An excellent printed blank for a building contract has been prepared by a joint committee from the National Association of Builders and the American Institute of Architects, published in Chicago, Ill., by the Inland Publishing Company of that city.

In most of the States "lien laws" have been enacted which are often a deplorable snare for unwary owners. Under such laws should the general contractor fail to pay in full his workmen or his supply dealers they may have recourse against the owner and may collect their claims from him regardless of the fact that he may already have paid the full amount due to the general contractor. Consequently it is customary to require from the contractor a bond in the full amount of the contract price, signed by himself and responsible sureties, agreeing to repay to the owner all losses, if any, which he may sustain by the operation of the lien laws, or through any other violation of the contract.

Building contracts generally provide for payments in installments as the work proceeds, *i. e.*, a certain sum to be paid when the first floor joists are laid, another sum when the roof is on, another when ready to plaster, etc. Each payment should represent about three-fourths of the value of work and material delivered and "in place" at the time of the payment, or since the previous payment. The last payment may be made in about a month after the completion of the building, and the contract should require the builder to make good, at his own expense, any original defect discovered during the first month of occupancy.

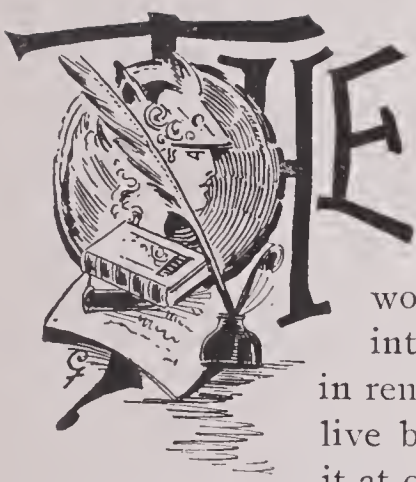
If these principles, the results of long experience, are duly observed, the disappointments and vexations which often attend the operation of house building will be largely if not wholly avoided.

ADDRESSES OF RESPONSIBLE ST. LOUIS CONTRACTORS.

Anderson Brothers, General Contractors and Builders, Room 52 Laclede Building.
Adam Bauer, Builder, Room 34 Emilie Building.
Kerr & Allan, Contractors and Builders, Rooms 212 and 213 Odd Fellows' Building.
H. F. Gruetzemacher & Co., Stone Masons, Room 51 Emilie Building.
Geo. P. Bruce Stone Co., Contractors for Cut Stone, Jefferson and Scott Avenues.
John Reitz & Co., Contractors for Cut Stone, 3210 Chouteau Avenue.
J. G. Doyle & Son, Contractors of Brickwork, 717 Chestnut Street.
Riddle, Rehbein Mfg. Co., Sash, Doors, Blinds and Wood Finish, 1301 O'Fallon Street.
J. W. Reinhardt, Stair Builder, 23 South Fifteenth Street.
J. M. Bixler & Co., Plasterers, 105 North Eighth Street.
John Lyons, Plumber, 415 Morgan Street.
Ring & Reardon, Plumbers, 3841 Finney Avenue.
Ruth & Simon, Galvanized Iron Cornices and Arch'l Sheet Metal Work, 1903-5 Locust Street.
Chas. W. Holland, Painter and Decorator, 411 North Twelfth Street.
Mullen & Hoppius Painting Co., 114 Olive Street.

CHAPTER X.

BUILDING ASSOCIATIONS.



OLD-FASHIONED way of raising a building fund was to lay aside every week or every month, whatever money could be spared for that purpose, and when, after months and years of self-privation and severe economy, the slowly accumulating "*nest egg*" had reached the requisite dimensions, the work of erecting a house was begun, though sometimes the hopeful owner would die before its completion. This plan was sure, if no sickness nor accident intervened, but it was slow, and involved many privations while boarding or living in rented quarters till the necessary fund had been saved. The new way is to join a live building association as soon as the plans are ready, build the house and move into it at once, and then pay the monthly savings back into the building association, where they will be safe, instead of putting them in a bank, or in some hiding-place of more doubtful security. No time is lost in this way, and the little family is in full possession and enjoyment of the new home all the time they are saving up the money to pay for it. Moreover, they cease paying rent, what they used to spend in this way now being applied directly to paying for the new house. Then, being stock-holders in the building association, they share in its annual profits, and this helps materially on the payments for the house.

While building associations of a rude kind have long maintained a feeble existence, the modern association on the improved serial plan is of recent date, and its rapid increase is one of the wonders of the Nineteenth Century. Six hundred new associations were incorporated in the year 1892, making an average of about two new associations for every working day in the year.

The shares in a building association usually range in value from $100 to $400. A very common value is $240 a share. A party wishing to build, subscribes for as many shares as he may require to

pay for the house in full. If his house will cost $2,400, and the shares are $240 each, he takes ten shares. On these he pays monthly dues of $1 per share, or $10 per month for the ten shares.

When ready to build he applies for a building loan of $2,400, to be secured by a deed of trust to the association until the series "*matures*," as it is called—*i. e.*, until the monthly payments, together with the dividends which he receives on his ten shares, equal the sum of $2,400. Then the deed of trust is released, the monthly dues cease, and the house is delivered to its happy owner paid for in full. The profits are derived from interest and premiums on the loans made for every building erected, and the monthly payments to borrowing members are increased for this purpose as soon as the building loan is taken out. Thus, the borrower pays a premium and interest on his own loan, and shares in the premiums and interest paid by every other borrower.

For the protection of their members, every association has a building committee, usually with an experienced architect or builder at its head, which carefully examines all plans and specifications, and visits the building from time to time during its progress, so as to see that the material and work conform to the contract. This is a great advantage to every borrower, since his building is carefully watched at almost no expense to himself. In a building association the interest of one is the interest of all.

In the ninth annual report of the United States Commissioner of Labor, Carroll D. Wright, the total number of building associations in the country is stated at 5,838 with 1,745,725 shareholders and 13,255,872 shares. The number of borrowing members is 455,411, or a little over 26 per cent. The net assets are over $257.00 per shareholder; the average loan is $1,120.00; the average age of the associations is six years. The total number of houses acquired through these associations is 314,755, the total profits exceed $80,000,000.00 and the total net assets are over $450,000,000.00.

These thrifty associations are instructive examples of the benefits of co-operation in the right direction, and of the rewards of diligent industry and prudent economy in this country.

Name of Association.	Office Address.	Secretary.	Capital Stock.	Shares.	Dues.	Interest.	Interest on Deposits.
Accommodation	19 N. 8th st	C. A. M. Schlierholz	$ 600,000.00	$240.00	$1.00	5%	6 to 7%
Acme	812 Chestnut st	T. F. Farrelly	300,000.00	200.00	1.00		
Active, Nos. 1, 2, 3 and 4	1001 Chestnut st	G. W. Davis	600,000.00	240.00		5%	6%
			600,000.00	240.00		5%	6%
			600,000.00	300.00		4%	6%
			600,000.00	300.00		4%	6%
Advance	623 Chestnut st	A. Dietmeyer					
Ætna Loan Co	707 Chestnut st	T. A. Johnson	4,000,000.00	500.00		6%	8%
Allemannia	707 Chestnut st	A. C. Trebus	600,000.00	300.00	1.00	4%	
American Investment	105 N. 9th st	A. Wenzlick	600,000.00	240.00		5%	6 to 7%
American Mutual	613 Chestnut st	E. J. Stannus					
Artisan	1110 Pine st	G. F. Murphy	600,000.00	240.00		5%	
*Aubert Place, Nos. 1 and 2	816 Chestnut st	D. B. Brennan	500,000.00	200.00	1.00	6%	
			480,000.00	240.00	1.00	5%	
Aurora Mutual	717 Chestnut st	R. Rutledge	500,000.00	200.00		18%	
Bank Clerks	821 Chestnut st	F. J. Hackman	600,000.00	300.00		6%	
Banner	1928 Chouteau ave	F. W. Plass	300,000.00	240.00		5%	
Beneficial	713 Chestnut st	C. C. Nicholls	1,000,000.00	400.00	2.00	6%	
*Benton	604 Pine st	C. E. Wehner	500,000.00	200.00		6%	
Bohemian No. 2	1328 Geyer ave	A. Klobasa	900,000.00	300.00		4%	
Bohemian American	1901 S. 12th st	C. J. Wolf					
Bremen	3602 N. Broadway	C. C. Crone					
Broadway	608 Marion st	C. Messmer	600,000.00	300.00		4%	4 to 6%
†Buckeye	708 Chestnut st	J. J. Gruchy	500,000.00	200.00		6%	
Caledonia	1021 Chestnut st	P. F. Vander Lippe	600,000.00	240.00		5%	
Centennial	10 N. 8th st	M. R. Cramer	1,200,000.00	240.00		5%	7%
Central	Elliot and St. Louis aves						
Charter Oak, Nos. 1 and 2	Odd Fellows' Block	J. G. O'Keefe	600,000.00	300.00		4%	6 to 7%
			600,000.00	300.00		4%	6 to 7%
‡Citizens	1013 Pine st	J. F. Brady	500,000.00	200.00		6%	
Clerks and Mechanics	322 Chestnut st	T. A. Rice	600,000.00	240.00		5%	
Citizens Mutual Savings			600,000.00	300.00		33⅓%	
Clifton Heights	19 N. 8th st	C. A. M. Schlierholz	600,000.00	300.00		4%	
Climax	208 Chamber of Commerce	W.F. MacGinnitie					
Columbia, Nos. 1 and 2	105 N. 9th st	A. Wenzlick	600,000.00	200.00		6%	
‡Commercial	713 Chestnut st	C. C. Nicholls	500,000.00	200.00		6%	
Commonwealth	902 Chestnut st	Howard Gambrill	1,200,000.00	240.00	1.00	6%	
Compton Hill	623 Chestnut st	A. Dietmeyer					
Concordia	608 Marion st	A. Bollin	400,000.00	200.00		6%	
‡Covenant Mutual	1005 Chestnut st	W. M. Horton	500,000.00	200.00		6%	
‡Continental	713 Chestnut st	C. C. Nicholls	500,000.00	200.00		6%	
Co-operative	616 Chestnut st	L. A. J. Lippelt	600,000.00	240.00		5%	
Cote Brilliante	714 Pine st	Wm. Zink	600,000.00	240.00		5%	
Crescent			600,000.00	300.00		4%	
Cottage	1001 Chestnut st	G. W. Davis	600,000.00	240.00		5%	
DeSoto Savings	1013 Pine st	J. F. Brady	500,000.00	200.00		6%	
Eclipse	808 Chestnut st	Adolph L. Steinmeyer					
Economy	618 Chestnut st	A. A. B. Woerheide	1,000,000.00	200.00	1.00	6%	
Edison, Nos. 1 and 2	704 Chestnut st	W. F. Parker	600,000.00	300.00	1.00	4%	
			600,000.00	300.00	1.00	4%	
Elaine	824 Chestnut st	Norfleet Hill	600,000.00	300.00		4%	
Electric	316 N. 6th st	F. A. Banister	600,000.00	240.00		5%	7%

Name of Assoeiation.	Office Address.	Seeretary.	Capital Stoek.	Shares.	Dues.	Interest.	Interest on Deposits.
Emerald	322 Chestnut st	J. Riee					
Enterprise	1414 S. Broadway	G. H Quellmalz					
Equality Savings	623 Chestnut st	A. Dietmeyer					
‡Excelsior Mutual	1005 Chestnut st	W. M. Horton	500,000.00	200.00		6%	
Exchange	704 Chestnut st	G. F. Bergfeld	600,000.00	240.00	1.00	5%	
Famous Mutual Savings Fund	10 N. 8th st	M. R. Cramer	1,000,000.00	200.00		6%	
Firemen's	813 Chestnut st	R. F. Kilgen	600,000.00	240.00		6%	
Fireside	1006 Chestnut st	W. M. Haley	600,000.00	240.00	1.08 1/3	55/12%	6%
Forest	704 Chestnut st	G. F. Bergfeld	600,000.00	300.00	1.00	4%	
Franco-Ameriean	707 Chestnut st	J. H. Trembley	600,000.00	200.00		6%	
F. P. Blair	6 N. 8th st	W. M. Korhammer	500,000.00	200.00		6%	
Franklin Savings	322 Chestnut st	T. A. Riee	600,000.00	240.00		5%	
‡Fraternal	716 Chestnut st	C. F. Vogel	600,000.00	240.00		5%	
Future Great	16 N. 8th st	P. T. Carr	600,000.00	240.00		5%	6 to 7%
Garfield Savings	322 Chestnut st	T. A. Riee	600,000.00	240.00		5%	
Garrison Mutual	3203 Easton ave	P. T. Madden	500,000.00	200.00		6%	
Gas and Eleetrie	411 N. 11th st	G. T. Thompson					
Gen'l Haneoek	623 Chestnut st	A. Dietmeyer					
German-Ameriean	623 Chestnut st	A. Dietmeyer					
German Mutual	616 Chestnut st	W. K. Walther	500,000.00	200.00		6%	
‡Germania	707 Chestnut st	A. C. Trebus	600,000.00	240.00		5%	
Gibraltar	Odd Fellows' Building	H. T. Smith	2,000,000.00	200.00	1.00		6 to 7%
‡Gladstone	618 Chestnut st	A. A. B. Woerheide	720,000.00	240.00	1.00	5%	
‡Globe	521 Pine	C. Kuhn	600,000.00	240.00		5%	
Granite	107 N. 8th st	J. Maguire	500,000.00	200.00		6%	
Great Western	813 Chestnut st	R. F. Kilgen	600,000.00	240.00		6%	
‡Harlem	716 Chestnut st	C. F. Vogel	600,000.00	240.00		5%	
Henry Clay	702 Chestnut st	C. J. Dunnerman	600,000.00	300.00		4%	
Henry Shaw	618 Chestnut st	A. A. B. Woerheide	500,000.00	200.00		6%	
‡Hibernia No. 2	1013 Pine st	J. F. Brady	500,000.00	200.00		6%	7%
Hoevel	1908 St. Louis ave	F. Hoevel	600,000.00	240.00		5%	
Home City	17 N. 8th st	J. W. Bergfeld	480,000.00	240.00		5%	7%
Home Comfort	105 N. 8th st	J. A. Watkins	600,000.00	300.00		4%	
*Home and Savings	813 Chestnut st	A. O. Rule	500,000.00	100.00	1.00	7.20%	7.20%
Home Mutual	211 N. 8th st	D. J. Hayden	600,000.00	240.00		6%	
Home Seekers	714 Pine st	W. Zink	600,000.00	300.00		4%	
Home and School	3540½ Easton ave	M. A. King					
Homestead Mutual	304 N. 8th st	L. B. Pierce					
House and Home	815 Chestnut st	Paul Jones	600,000.00	240.00		6%	
Humboldt	707 Olive st	A. L. Berry					
Hyde Park	3602 N. Broadway	C. C. Crone	600,000.00	240.00	1.00	5%	5 to 6%
Hydraulic	4022 Manchester road	A. H. Kansteiner					
‡Imperial	311 Commercial Building	C. H. Sawyer	600,000.00	400.00		6%	
‡Improvement	714 Pine st	W. Zink	500,000.00	200.00		6%	
Independent	1140 Chestnut st	M. F. Ruler					
Industrial	1001 Chestnut st	G. W. Davis	600,000.00	240.00		5%	
Investment	713 Chestnut st	C. C. Nieholls	1,000,000.00	400.00		6%	
‡Irish-American Savings	322 Chestnut st	T. A. Riee	600,000.00	240.00		5%	
Iron Hall	105 N. 8th st	J. S. Gordon	600,000.00	240.00		5%	
J. B. Eads	102 N. 3d st	W. F. MacGinnitie	600,000.00	300.00		4%	

Name of Association.	Office Address.	Secretary.	Capital Stock.	Shares.	Dues.	Interest.	Interest on Deposits.
Jefferson	613 Chestnut st	M. Kelly	$600,000.00	$240.00		5%	5%
Knights	318 N. 8th st	G. W. Wilson	480,000.00	240.00	1.00	5%	
Laclede No. 2	211 N. 8th st	D. J. Hayden					
Lafayette Mutual	706 Pine st	A. L. Thompson					
*Leader			1,000,000.00	100.00		7.20%	7%
‡Legion	318 N. 8th st	F. J. Wade	480,000.00	240.00	1.00	5%	
Liberty	3715 N. Broadway	J. H. Gundlach	600,000.00	300.00		4%	
Lincoln	704 Chestnut st	G. F. Bergfeld	600,000.00	240.00	1.00	5%	6 to 7%
Lindell Savings	921 Chestnut st	D. Sheppard	600,000.00	240.00		5%	5½ to 7%
Lindenwood	707 Chestnut st	S. Rathell					
Lucas	921 Chestnut st	D. Sheppard	600,000.00	360.00		4%	
Marquette Mutual	211 N. 8th st	D. J. Hayden	600,000.00	200.00		6%	
Mechanics Mutual	211 N. 8th st	D. J. Hayden					
Mechanics No. 2	211 N. 8th st	D. J. Hayden					
Mercantile No. 2	915 Chestnut st	J. F. McDermott					
Merchants	15 N. 7th st	M. T. Sweeney					
Merchants and Mechanics	1123 Chestnut st	H. Kotthoff	500,000.00	200.00	1.00	6%	
‡Metropolitan Mutual	318 N. 8th st	L. E. Anderson	600,000.00	240.00	1.00	5%	
‡Midland	103½ N. 8th st	J. P. Whyte	600,000.00	200.00		6%	
‡Mississippi	318 N. 8th st	J. H. Holmes	480,000.00	240.00		5%	
Missouri	1001 Chestnut st	H. S. Tuttle	5,000,000.00	1,000.00	10.00	6%	
Missouri Guarantee	219 N. 4th st	B. S. Newland					
Model Building and Loan	1813 N. Jefferson ave	A. G. Nahm					
Mound City	322 Chestnut st	T. A. Rice	600,000.00	300.00		8%	7%
Mount Olive, Nos. 1 and 2	623 Chestnut st	A. Dietmeyer					
Mullanphy	19 S. Broadway	R. M. Foster	600,000.00	240.00		5%	
Mutual Benefit, Nos. 1 and 2	701 Chestnut st	Samuel Bowman	600,000.00 600,000.00	240.00 240.00		55/12% 55/12%	
‡National	716 Chestnut st	C. F. Vogel	600,000.00	240.00		5%	
‡New Era	1006½ Chestnut st	B. W. Thornhill	500,000.00	200.00	.50	6%	
New Plan	17 N. 8th st	J. W. Bergfeld	800,000.00	200.00	1.00	6%	7%
Nickle Savings	3d and Chouteau ave	J. Walter	1,000,000.00	250.00	.50	6%	
North End			600,000.00	240.00		5%	
North St. Louis	2000 E. Grand ave	J. C. Obert	600,000.00	300.00		4%	
‡Northwestern	17 N. 8th st	A. J. Naughton	500,000.00	200.00	1.00	6%	
Oak	17 N. 8th st	J. W. Bergfeld	500,000.00	200.00	1.00	6%	7%
Park	421 Olive st	C. D. Greene, Jr	600,000.00	240.00		6%	
Parnell Savings	322 Chestnut st	T. A. Rice	1,500,000.00	300.00		8%	5%
‡Peabody	618 Chestnut st	A. A. B. Woerheide	500,000.00	200.00		6%	
‡Peerless	311 Commercial Building	C. H. Sawyer	600,000.00	400.00		6%	
Peter Cooper, Nos. 1, 2, 3, 4 and 5	405 N. 6th st., Equitable Bld'g	J. B. Follett	6,600,000.00	240.00		55/12%	
Phœnix, Nos. 1 and 2	704 Chestnut st—assigned to	A. R. Schollmeyer	600,000.00	300.00		4%	6 to 7%
‡Powhattan	304 N. 8th st	L. B. Pierce	500,000.00	200.00		6%	
Printing Trades Mutual	618 Chestnut st	A. A. B. Woerheide	600,000.00	240.00		5%	
‡Progressive	304 N. 8th st	S. S. Spencer	500,000.00	200.00		6%	
Prosperity	2000 E. Grand ave	E. W. Woods	600,000.00	240.00		5%	5%
Provident	919 Chestnut st	C. F. A. Mueller	600,000.00	240.00		5%	6%
Real Estate, Nos. 1, 2 and 4	714 Pine st	W. Zink	1,000,000.00 1,200,000.00 600,000.00	400.00 480.00 300.00		6% 5% 4%	
Real Estate No. 3	620 Chestnut st	Otto Weber	1,200,000.00	300.00		4%	

Name of Association.	Office Address.	Secretary.	Capital Stock.	Shares.	Dues.	Interest.	Interest on Deposits.
Red Cross	17 N. 8th st	A. J. Naughton	600,000.00	240.00	1.00	5%	7%
Reservoir	8 N. 12th st	J. F. Klinglesmith	600,000.00	240.00		5%	7%
Revenue	620 Chestnut st	J. S. Blake					
Richmond	821 Chestnut st	F. J. Hackman	600,000.00	300.00		5%	
Robert Emmet	4117 Easton ave	B. E. W. Ruler					
Rock Springs, Nos. 1 and 2	4022 Manchester road	A. H. Kansteiner	480,000.00 600,000.00	240.00 240.00		5% 5%	
Royal	813½ Chestnut st	N. S. Wood	100,000.00	100.00		8%	
*Safety	1017 Chestnut st	E. S. Fish	600,000.00	240.00		5%	
‡Security, Nos. 1 and 2	720 Chestnut st	J. H. Tiernan	500,000.00	200.00		6%	6 to 7%
Sherman	921 Chestnut st	D. Sheppard	600,000.00	300.00		4%	5½to7%
Shoe and Leather	1023 Locust st	O. Zakrzewski	600,000.00	240.00		5%	
Social	2819 St. Louis ave	J. F. Bottger	600,000.00	300.00		4%	6 to 7%
South End	6915 S. Broadway	F. W. Mott	500,000.00	200.00		6%	
South Side	1821 S. Jefferson ave	H. W. Mepham	600,000.00	240.00		5%	
‡South West	622 Park ave	H. J. Krebs	400,000.00	200.00		6 to 8%	
Standard	816 Olive st	W. B. Anderson					
*Starling	824 Chestnut st		600,000.00	240.00		5%	
*State Savings No. 1	927 Chestnut st	B. M. Loewenstein	600,000.00	300.00		4%	
Stephen Girard	618 Chestnut st	A. A. B. Woerheide	500,000.00	200.00		6%	
‡St. Louis Central	106½ Chestnut st	B. W. Thornhill	500,000.00	200.00	.50	6%	
St. Louis Home and Savings	813 Chestnut st	A. O. Rule	500,000.00	100.00			
St. Louis Mutual No. 3	3513 Walnut st	H. Kromrey					
St. Louis Savings	322 Chestnut st	T. A. Rice	1,000,000.00	200.00		6%	
‡St. Louis Turners, Nos. 1 and 2	404 Market st	F. Nohl	350,000.00 250,000.00	200.00 200.00		6% 6%	
Suburban Mutual	211 N. 8th st	D. J. Hayden					
Superior, Nos. 1 and 2	114 N. 8th st	J. H. Farish	600,000.00 600,000.00	300.00 300.00		4% 4%	
The Leader	105 N. 8th st	J. S. Gordon					
Tower	2000 E. Grand ave	E. W. Woods					
Tower Grove and Southwestern	2604 S. Jefferson ave	W. J. Lewis	600,000.00	240.00		5%	
Trades	316 N. 6th st	F. A. Banister					
Travelers' P. A	722 Chestnut st	J. G. McNair					
Trust Fund Loan	405 N. 6th st	W. Ennes	300,000.00	100.00	1.00	8%	8%
Turners	10th and Carroll sts						
Tuscan	1123 Chestnut st	H. Kotthoff	600,000.00	240.00	1.00	5%	
Uncle Sam's	720 N. 4th st	H. S. Tuttle	600,000.00	300.00		4%	
Underwriters	814 Chestnut st	J. C. Hall	600,000.00	240.00		5%	
*Union	816 Chestnut st	J. W. Brennan	480,000.00	240.00		5%	
Valley Building Co	421 Olive st	J. F. Weston	500,000.00	200.00		6%	
Very Best	120 N. 3d st	W. H. Forse					
Virginia	318 N. 8th st	J. H. Holmes	480,000.00	240.00		5 to 8%	6 to 7%
Wabash	9 N. 8th st	O. T. C. Colonius	300,000.00	240.00		5%	
Washington Irving	17 N. 8th st	J. W. Bergfeld	600,000.00	240.00	1.00	5%	7%
Washington Savings	322 Chestnut st	T. A. Rice	600,000.00	240.00		5%	5%
Webster Groves	707 Chestnut st	J. H. Trembely					
West End	616 Chestnut st	L. A. J. Lippelt	500,000.00	200.00		6%	5%
West St. Louis	4101 Easton ave	H. C. Barnard					

Name of Association.	Office Address	Secretary.	Capital Stock.	Shares.	Dues.	Interest.	Interest on Deposits.
Western	311 Commercial Building	C. H. Sawyer	$500,000.00	$100.00	-------	6%	6%
‡Western Mutual	813 Chestnut st	R. F. Kilgen	500,000.00	100.00	1.00	6%	8%
Workingmen's	17 N. 8th st	A. J. Naughton	600,000.00	240.00	1.00	5%	7%

All associations not marked * or ‡ are serial.
* Those marked thus are permanent.
† These associations charge an entrance fee.
‡ These are terminating.
All pay six per cent. interest on deposits unless stated otherwise.
The Buckeye charges admission fee of 25 cents per share.
The Real Estate No. 1 charges entrance fee $1.00 per share.
The Home Savings charges admission fee of $1.00 per share. Its monthly dues are 65 cents per share.
The monthly dues in the Imperial, Parnell Savings and Real Estate, Nos. 2 and 3 are $2.00 per share.
The monthly dues in the Missouri are $6.00 per share.
The monthly dues in the Mound City are $2.00 per share.
The monthly dues in the Mutual Benefit, Nos. 1 and 2 and the Peter Coopers are $1.08⅓ per share.
The monthly dues in the Ætna are $2.00 to $5.00 per share.
The monthly dues in the Leader are 40 cents per share.
The monthly dues in the Trust Fund are 50 cents per share.
The monthly dues in the Western are 60 cents per share.
The West End dues are 25 cents per share weekly.

MISSOURI BUILDING ASSOCIATIONS OUTSIDE OF ST. LOUIS AND KANSAS CITY.*

Name of Association.	Office Location.	Secretary.	Capital Stock.	Shares.	Dues.	Interest on Deposits.
Aurora	Aurora	W. B. Cochran	$ 200,000.00	$ 200.00	$1.00	
Boonville	Boonville	R. Hadelich	300,000.00	200.00	1.00	
Brookfield	Brookfield	Geo. W. Martin	400,000.00	200.00	1.00	
Cameron	Cameron	S. P. Allen	400,000.00	200.00	1.00	
Jasper County	Carthage	W. A. Williams	500,000.00	200.00	1.00	6%
Marion	Carthage	W. A Williams	600,000.00	200.00	1.00	6%
Chillicothe	Chillicothe	Douglass Stewart		200.00	1.00	
Fulton B. & L. A	Fulton	W. E. Jameson	300,000.00	200.00	1.00	
Gallatin	Gallatin	Boyd Dudley	200,000.00	200.00	1.00	
Marion County Mutual	Hannibal	Adam Thin	400,000.00	200.00	1.00	
Missouri Guarantee Savings	Hannibal	Herbert Harris	10,000,000.00	1,600.00	5.00	
Mechanics	Hannibal	L. W. Boswell	500,000.00	200.00	1.00	
Workingmen's Mutual	Hannibal	Geo. D. Clayton	360,000.00	240.00	1.00	
Mutual Saving Fund A	Hermann	Robert Baumgaertner	130,000.00	200.00	2.00	
Higginsville	Higginsville	H. F. Campbell	200,000.00	200.00	1.00	6%
Home	Higginsville	H. C. Schwartz	200,000.00	200.00	1.00	6 to 10%
Capital City	Jefferson City	C. W. Wallendorf	300,000.00	200.00	1.00	
Jefferson City	Jefferson City	C. W. Wallendorf	400,000.00	200.00	1.00	
Home	Joplin	E. Webster	400,000.00	200.00	1.00	
Ozark	Lebanon	H. T. Wright	160,000.00	200.00	1.00	6%
Lexington	Lexington	Chas. W. Loomis	350,000.00	200.00	1.00	
Macon	Macon	E. L. English	250,000.00	200.00	1.00	
New Era	Marshall	J. H. Boyer	200,000.00	200.00	1.00	6%
Mutual	Marshall	B. F. Shepherd	200,000.00	200.00	1.00	6%
Maryville Homestead	Maryville	R. L. McDougal	200,000.00	200.00	1.00	9%
Mexico	Mexico	J. A. Glandon	700,000.00	200.00	1.00	
Moberly	Moberly	V. M. Tedford	1,200,000.00	200.00	1.00	8 if any
Home	Moberly	W. P. Cave	500,000.00	200.00	1.00	
Mt. Vernon	Mt. Vernon	J. B. Good	100,000.00	200.00	1.00	
Neosho	Neosho	J. C. Gever	300,000.00	200.00	1.00	
Palmyra Savings	Palmyra	Frank W. Smith	360,000 00	240.00	1.00	
Poplar Bluff	Poplar Bluff	J. T. Davison	200,000.00	200.00	1.00	
Richmond	Richmond	Geo. Schweich	400,000.00	200.00		
Salisbury	Salisbury	Gus. A. Hall	320,000.00	200.00	1.00	
Equitable	Sedalia	C. B. Rodes	4,000,000.00	200.00	1.00	8%
Midland Savings	Sedalia	J. E. Ritchey	1,000,000.00	100.00		6 to 8%
Mutual Benefit	Sedalia	P. G. Stafford	250,000.00		0.60	6 to 8%
Slater	Slater	R. T. Brightwell	200,000.00	200.00	1.00	6%
Home	Springfield	M. A. Lapham	1,000,000.00	100.00	0.75	
Midland Savings	Springfield	Geo. A. C. Woolley	1,000,000.00	200.00	Various.	6 to 7%
National	Springfield	R. P. Haldeman	5,000,000.00	500.00	3.00	3 to 8%
St. Charles	St. Charles	R. C. Haenssler	600,000.00	200.00	1.00	
South St. Joseph	St. Joseph	Milton C. Powell	500,000.00	200.00	1.00	
Mechanics	St. Joseph	J. H. Lancaster	500,000.00	200.00	1.00	
Midland	St. Joseph	Fred. A. H. Garlichs	500,000.00	200.00	1.00	
Royal Loan	St. Joseph	Chas. N. Robinson	1,000,000.00	100.00	0.60&$1.	
Peoples Home and Savings	St. Joseph	W. L. Buechle	2,000,000.00	200.00	1.00	
Provident	St. Joseph	H. S. Smith	500,000.00	200.00	1.00	

*This List embraces most of the prominent Associations in the State, excepting a few from which the data could not be obtained in time for the publisher.

PROMINENT BUILDING ASSOCIATIONS IN CENTRAL AND SOUTHERN ILLINOIS *

Name of Association.	Office Location.	Secretary.	Capital Stock.	Shares.	Dues.
Alton Germania	Alton	R. Grossrau	$1,000,000.00	$ 100.00	$0.50
Bluff City Workingmen's	Alton	J. T. McGinnis	1,000,000.00	100.00	0.50
Piasa Building and Loan	Alton	J. T. McGinnis	5,000,000.00	100.00	0.50
Anna Building and Loan	Anna	D. W. Goodman	1,000,000.00	100.00	0.50
Beardstown Building and Loan	Beardstown	R. H. Garin	1,000,000.00	100.00	0.50
Mutual Loan and Savings	Beardstown	T. K. Condit			
Citizen's Loan and Savings	Belleville	H. E. Schrader	500,000.00	Various.	0.50
First Mutual	Belleville	A. M. Wolleson	1,000,000.00	100.00	0.50
Central	Cairo	Matt C Metzger	1,000,000.00	100.00	0.53
Citizens	Cairo	J. C. Crowley	1,000,000.00	100.00	0.50
Carbondale	Carbondale	C. W. Williams	500,000.00	100.00	0.50
Carlinville	Carlinville	W. O. Steinmeyer	500,000.00	100.00	0.50
Greene County	Carrollton	F. M. Roberts			
Centralia	Centralia	R. J. Moore	5,000,000.00	100.00	0.50
Home	Centralia	O. V. Parkinson	2,000,000.00	100.00	0.55
Charleston Homestead	Charleston	F. K. Dunn	1,000,000.00	100.00	0.65
Coles County	Charleston	C. S. Wiley	1,000,000.00	100.00	0.65
Collinsville	Collinsville	N. W. Chandler	500,000.00	100.00	0.50
Danville	Danville	Jas. H. Phillips	10,000,000.00	100.00	0.60
Danville Benefit	Danville	M. J. Wolford	5,000,000.00	100.00	0.54
Germania	Danville	C. C. Winter	10,000,000.00	100.00	0.60
Home	Danville	Jas. H. Phillips	5,000,000.00	100.00	1.00
Vermilion County	Danville	B. E. Bandy	5,000,000.00	100.00	0.15 Weekly
People's Savings	Decatur	Albert Barnes	5,000,000.00	100.00	0.50 & 0.70
Savings Fund	Decatur	B. K. Durtee	1,000,000.00	100.00	0.50
St. Clair	East St. Louis	D. S. Sage	1,000,000.00	100.00	0.50
St. Patrick's Mutual	East St. Louis	M. B. Sheridan	500,000.00	100.00	0.50
Fidelity Savings	Galesburg	A. Nelson	3,000,000.00	100.00	0.50
Mechanics' Homestead	Galesburg	L. W. Sanborn	2,000,000.00	100.00	0.50
Mutual Loan	Galesburg	F. S. Bartlett	1,000,000.00	100.00	0.50
Hillsboro	Hillsboro	J. E Colvin	2,000,000.00	100.00	
Havana	Havana	I. N. Mitchell	500,000.00	100.00	0.50
Jacksonville Loan	Jacksonville	R. A. Gates	2,000,000.00	100.00	0.12½ Weekly
Security Savings	Jacksonville	R. A. Gates	5,000,000.00	100.00	0.30
Oil City	Litchfield	H. H. Hood	1,000,000.00	100.00	0.50
Macomb	Macomb	B. F. McLean	500,000 00	100.00	0 50
Mattoon	Mattoon	J. W. Witlfington	282,623.00	100.00	0.65
Moline	Moline	J. W. Warr	600,000.00	100.00	0.50
Monmouth	Monmouth	T. G. Peacock	66,024.00 paid in	100.00	0.50
Olney	Olney	C. S. Mace	5,000,000.00	100.00	0.50
Pana	Pana	L. S. Ham	500,000 00	100.00	0.50
German American Savings	Pekin	E. U. Abrahams	800,000.00	100.00	0.50
Pekin Loan and Homestead	Pekin	C. A. Kuhl	5,000,000.00	100.00	0.50
Gem City	Quincy	H. B. Dines	1,000,000.00	100.00	1.00
People's Savings	Quincy	B. G. Vasen	5,000,000.00	100.00	0.50
Quincy	Quincy	B. G. Vasen	5,000,000.00	100.00	0.50
Rock Island Mutual	Rock Island	E. H. Guyer	10,000,000.00	100.00	0.50
Sparta	Sparta	T. B. Stephenson	1,000,000.00	100.00	0 50
German American Savings	Springfield	C. F. Herman	5,000,000.00	100.00	0.50 & 1.00
Springfield City	Springfield	Geo. J. Barrett	10,000,000.00	100.00	0.55

Name of Association.	Office Location.	Secretary.	Capital Stock.	Shares.	Dues.
Springfield Homestead	Springfield	C. P. Kane			
Workingmen's Savings	Springfield	J. Ritter	$5,000,000.00	$100.00	$0.25 weekly
Workman's	Springfield	J. W. Freund	500,000.00	100.00	0.55 & 1.10
Staunton Loan	Staunton	Tom Blair	500,000.00	100.00	0.50
Christian County Savings	Taylorville	H. F. Davidson			
Tuscola Benefit	Tuscola	A. W. Wallace	2,000,000.00	100.00	0.12½ Weekly
Citizen's Mutual	Vandalia	F. I. Henry	5,000,000.00	100.00	0.65

* The limits of this book permit the listing of only the more prominent State Associations which have replied promptly to inquiries for data.

CHAPTER XI.

CONCLUSION.

IN CONCLUSION, a few practical hints remain as to matters not embraced in the preceding chapters. In no direction has the path of invention and improvement been more rapid or the progress more wonderful than in the materials and processes of house building. The old is constantly being superseded by the new, and new wants are daily developed for which new provision is demanded. An important preliminary to amateur house planning, therefore, should be to procure the catalogues, circulars, etc., which manufacturers and dealers send free on application, and by a careful perusal to educate one's self to the latest, best and cheapest of the various materials and processes placed at the disposal of house builders.

For example, paper is now used very extensively in building to exclude moisture and vermin, to render floors and partitions sound proof, for roofing purposes, and in other ways which can most readily be learned from the circulars and catalogues of dealers in building papers. A single layer of good building paper, costing only thirty cents for one hundred square feet, on the outside walls of a frame house, will add greatly to its warmth and comfort, and will save in fuel enough in one year to more than repay its entire cost.

For flat roofs, with a fall not exceeding one-half inch to the foot, nothing better nor cheaper has ever been invented than the gravel composition roof, which is found on all the most important business blocks, hotels, stores, warehouses, etc., in St. Louis. It is inexpensive in first cost, it is very durable, and requires no attention after being laid except to be let alone. Responsible makers guarantee these roofs five years. They are not available on steep roofs, however, where shingles, slate, tin, tiles, etc., are used.

For walls, brick is the most durable material known, and, in the end, it is the cheapest. Until recently, an objection to the use of brick has been the impossibility of obtaining ornamental effects without a large increase of expense. This is now obviated by the artistic, beautiful and cheap moulded

bricks which are shown in the illustrated catalogues of leading makers, and which place the most refined ornament within the reach of any purse. Good brick is indestructible by fire or the elements, and it needs no paint to preserve it. There is a wide variety of colors in modern bricks, as buff, pink, brown, etc., and colored mortars are made to correspond, producing very artistic effects. Rock-faced bricks are made, to imitate stone work; enameled bricks are used instead of plastering in kitchens, laundries, stables, etc., and a new form of brick, 2x4x12, called Roman brick, is very popular.

For sidewalks in front of a city house, and for entrance paths, etc., also for laundry and stable floors, nothing has ever been found so durable, clean, beautiful and comfortable as granitoid. This is a layer of cinders, or finely broken stone or gravel, with a top dressing of crushed granite in Portland cement. When properly constructed, it is as durable as the natural stone itself. The honor of inventing this valuable material is claimed by Mr. Preston M. Bruner, of St. Louis.

Suburban houses are generally of frame covered with siding or shingles, which are often cut to ornamental shapes and are laid in a variety of patterns. It is customary to color the shingles on roofs and walls with creosote stains. These preserve the material and produce charming color effects. The cost of these stains is trifling, and they are invaluable in preventing decay and enhancing the beauty of the house.

For interior finish, the choice is between paints of various tints, with and without graining, and for finishing in the natural color. For the latter, special varnishes or "oil finishes" are made. These, when properly selected and applied, produce a beauty and delicacy which can be obtained in no other way. American people have yet to learn the beauty of their native woods, as brought out by a good varnish or oil finish. But so much disappointment has resulted from the use of inferior and adulterated varnishes, that prudent owners, realizing the importance and economy of a perfectly reliable varnish, sometimes procure their own varnish from makers of known standing, and have it put on by a skillful workman. This involves very little expense, the actual quantity used on one job being comparatively small. The entire cost of the finest and most durable varnish, for a medium house, will hardly exceed eighteen or twenty dollars, and the difference in cost between this and the cheap stuff so often used is still less

The hardware of a house is likewise an item in which modern improvement has placed an excellent article at such a low price that there is no economy in using flimsy goods. It has already been advised that the owner shall select and furnish his own locks, bolts, sash fasteners, lifts, etc., and have them put on by the contractor. Neat hardware helps the appearance of a house very materially.

Where electric light is available, a new house should be wired for it; in other localities it is customary to pipe for gas. The economy of coal oil is seriously reduced from the inferior quality of glass used in lamp chimneys, and the labor of filling and cleaning lamps, etc. For convenience, cleanliness and safety, the superiority of electricity or gas is very great.

In plumbing, a complete revolution has been effected within the past ten years. Iron or porcelain bath tubs, sitz tubs, etc , porcelain water closets with special porcelain supply tanks, and marble and porcelain lavatories, have superseded the old style of fixtures. Marble floors and marble or tile walls are common in bath rooms, and all work of every kind is exposed, so as to leave no corner nor crack where dirt, vermin and disease may harbor. A modern bath room, as now furnished, is in a sanitary and artistic respect, one of the most noteworthy triumphs of the end of the Nineteenth Century. These improvements add somewhat to the first cost of a modern house, but the benefits to health and life are beyond all comparison. The house is better and cleaner, and its inmates live longer to enjoy it.

Wooden mantels have largely supplanted the marble, slate and iron mantels, which were once so common. This is not because they are better for practical purposes in connection with a grate fire, but because the grate fire has become chiefly an ornamental appendage in most houses, and because a tasteful wooden mantel "furnishes" a new house so effectively. The making of wooden mantels and other interior decorations has now become a special business of itself. Consequently a great variety of artistic and elegant mantels are produced and kept in stock at surprisingly low prices. Old-fashioned people, who enjoy grate fires for heating purposes as in the good old times, will prefer marble, slate or iron mantels, as more serviceable than wood; while, in consequence of the fashionable preference for wood, the other mantels are now offered at prices lower than ever before. They are to be had of marble dealers.

A very noteworthy feature of recent progress has been the increased use of marble in building.

The author claims to have been the first to introduce in St. Louis in houses of moderate cost a recessed front entrance, open to the weather, wainscotted at the sides with marble, and with all the steps and risers of marble. This work was inexpensive, durable, easy to clean, and exceedingly bright looking and attractive to every one. These marble vestibules and steps did more than any other single feature to advertise these houses, and to fill them with a superior class of tenants. Hence, they proved to be an excellent investment for their owner.

Great progress has been made of late years in the qualities, varieties and prices of "art glass," as it is now called. This term embraces a wide range of stained, cathedral, muranese, ondoyant, schoppen, chipped, crackled, beveled, mitred, and other styles of clear and colored glass; also, the circular "rondels" and cut and stamped "jewels," which add to the brilliancy of the glass. A peculiar charm about art glass is that its beauty never fades nor grows dim. Its color is in the light that shines through it, and this light is as clear and bright to-day as when it first illuminated the Garden of Eden.

Wall and ceiling decoration has also made great advance, both in tinted and painted effects, and in the very artistic wall papers, which are fashionable and cheap. Painted decoration is durable and washable, and is *exclusive;* no one else can claim the same design. Papers are elegant and rich in effect, and of such variety as to afford a wide field for the display of an owner's taste. A white wall looks cold and bare until it is papered or tinted.

Wood carpeting, or parquetry, partakes of the natures of both ornament and furnishing. An excellent plan is to have a centre floor of soft pine covered with a good rug, and a border, eighteen inches more or less in width, all around of wood carpet. An immense variety of patterns is manufactured and shown in the catalogues of dealers.

For heating a house, the modern hot water apparatus is the best where it can be afforded. Next in efficiency, cost and economy of fuel, comes steam; then the hot-air furnace; then the individual stove. Each system has its advocates, who are disposed to recognize no merit in any other; but in the hands of experienced and responsible parties, excellent results may be confidently expected with any of them. It is unwise to rely upon inexperienced and irresponsible parties under any circumstances whatever.

The Investigation of Titles to Real Estate.

BEFORE purchasing a lot for a home or for investment, be sure to have the title examined by the most responsible and reliable title examiner, and thus save yourself endless annoyance and loss.

In 1890 the St. Louis Trust Company, with a capital and surplus of $3,000,000, established its Title Department at 615 Chestnut Street, with H. Y. Sherwood, Manager. This Department contains a complete record of every instrument of writing from our earliest history in America in anywise affecting lands in St. Louis City and County, with plats of every lot, tract or subdivision of land therein, together with a record of every judgment rendered in our courts affecting such titles, and a complete index of all the proceedings had in the settlement of any estate. In addition to all this, the Title Department of the St. Louis Trust Company has a vast amount of valuable information, collected within the last fifty years, which can be obtained from no other source. This Department is now thoroughly under control, and its system is so complete and perfect that work can be done within from twelve to twenty-four hours, and even in less time when occasion demands it, instead of having to wait a week or longer, as is the rule with other concerns. With these facilities, and with the best legal advice obtainable, there is no reason why this Department should not receive the generous support it deserves. This Company has introduced a new feature in this department of its business, *guaranteeing titles absolutely*. *This Guaranty*, supported as it is by the great wealth of the Company, is in itself an instrument of title equal in value to the property itself. Heretofore nothing could be obtained in St. Louis but an *Abstract* or a *Certificate*. This departure will be warmly welcomed here and must prove very successful and serviceable. A *Guaranty* stands upon the same footing as a *Warranty*.

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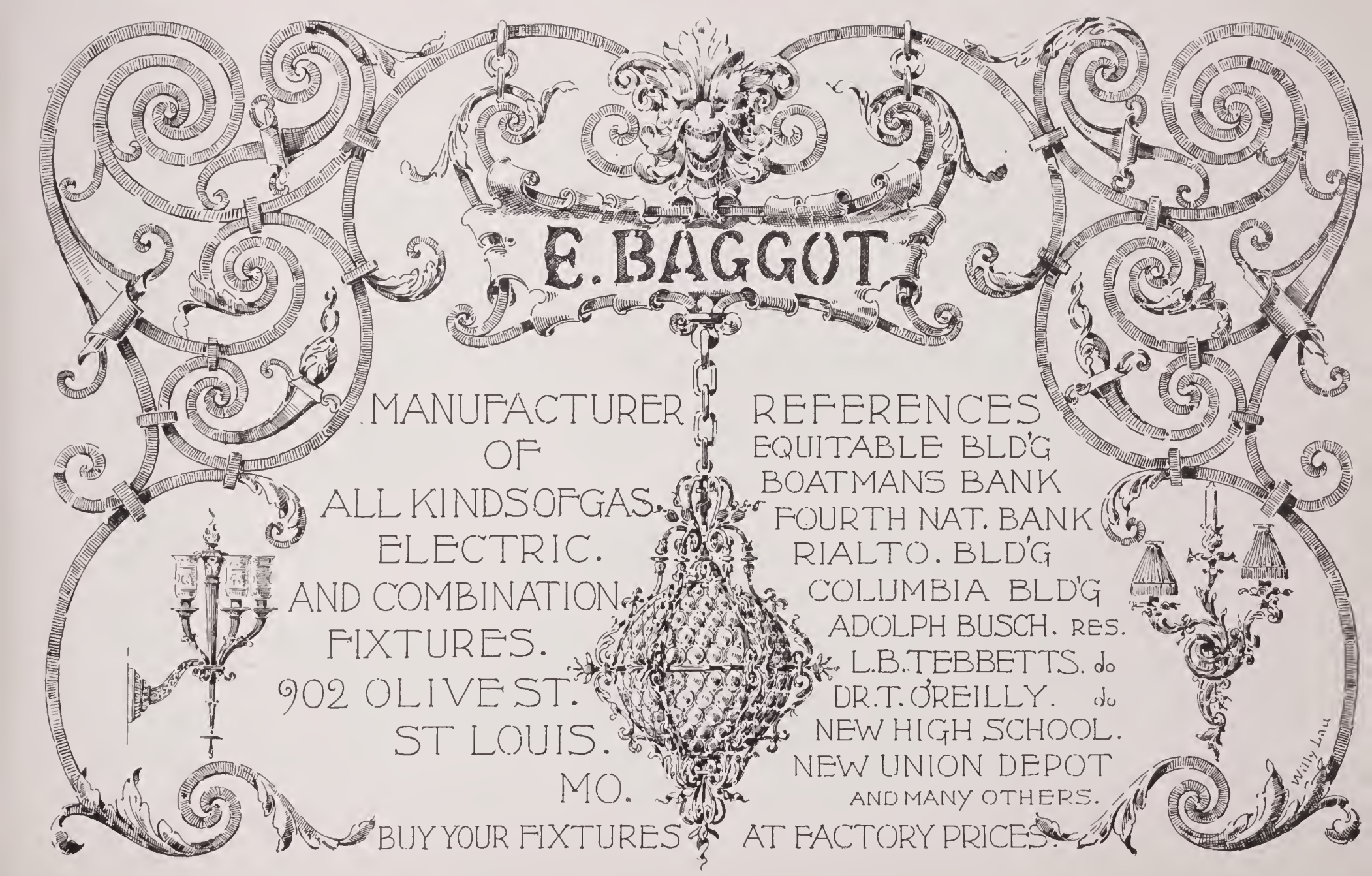
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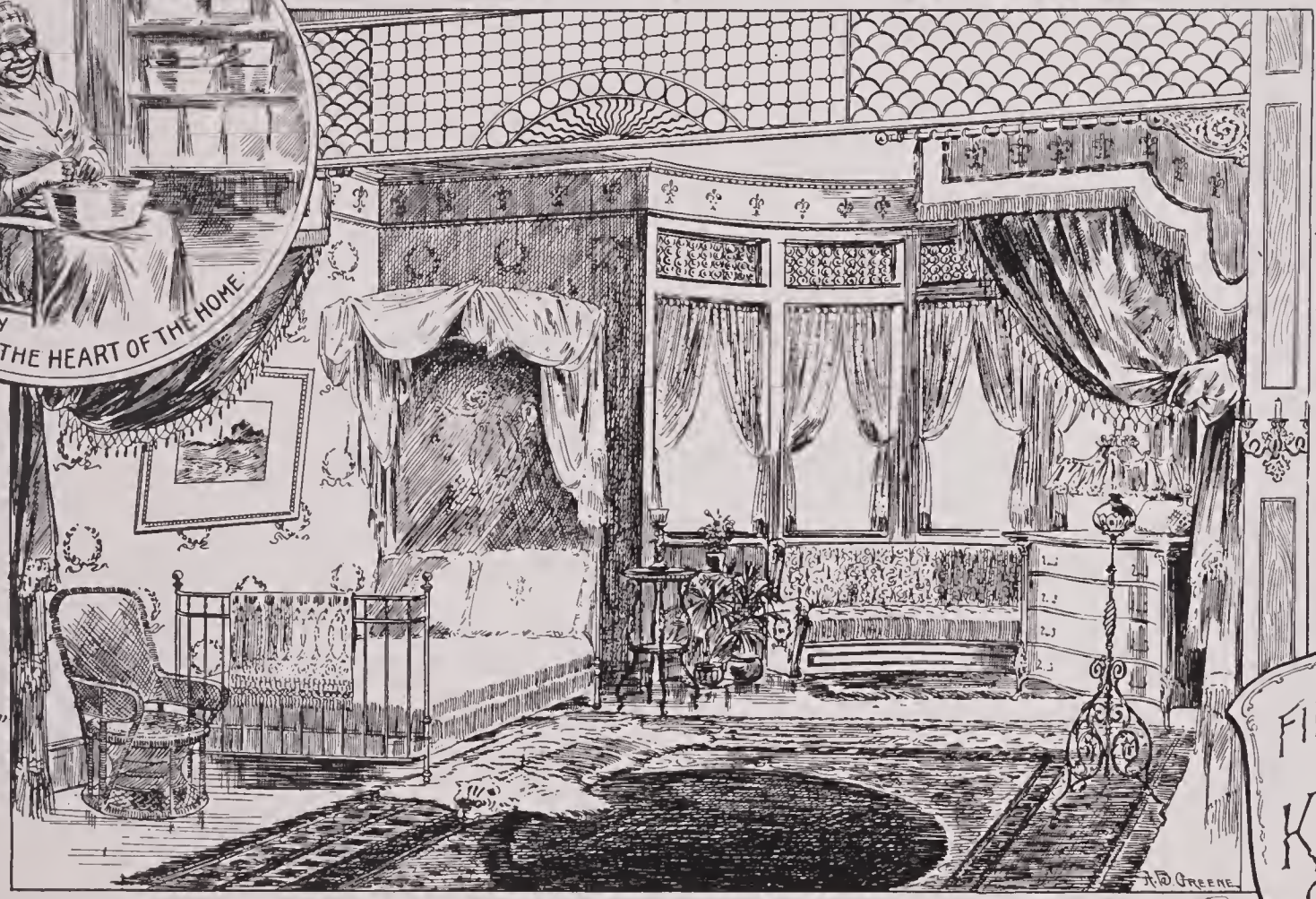

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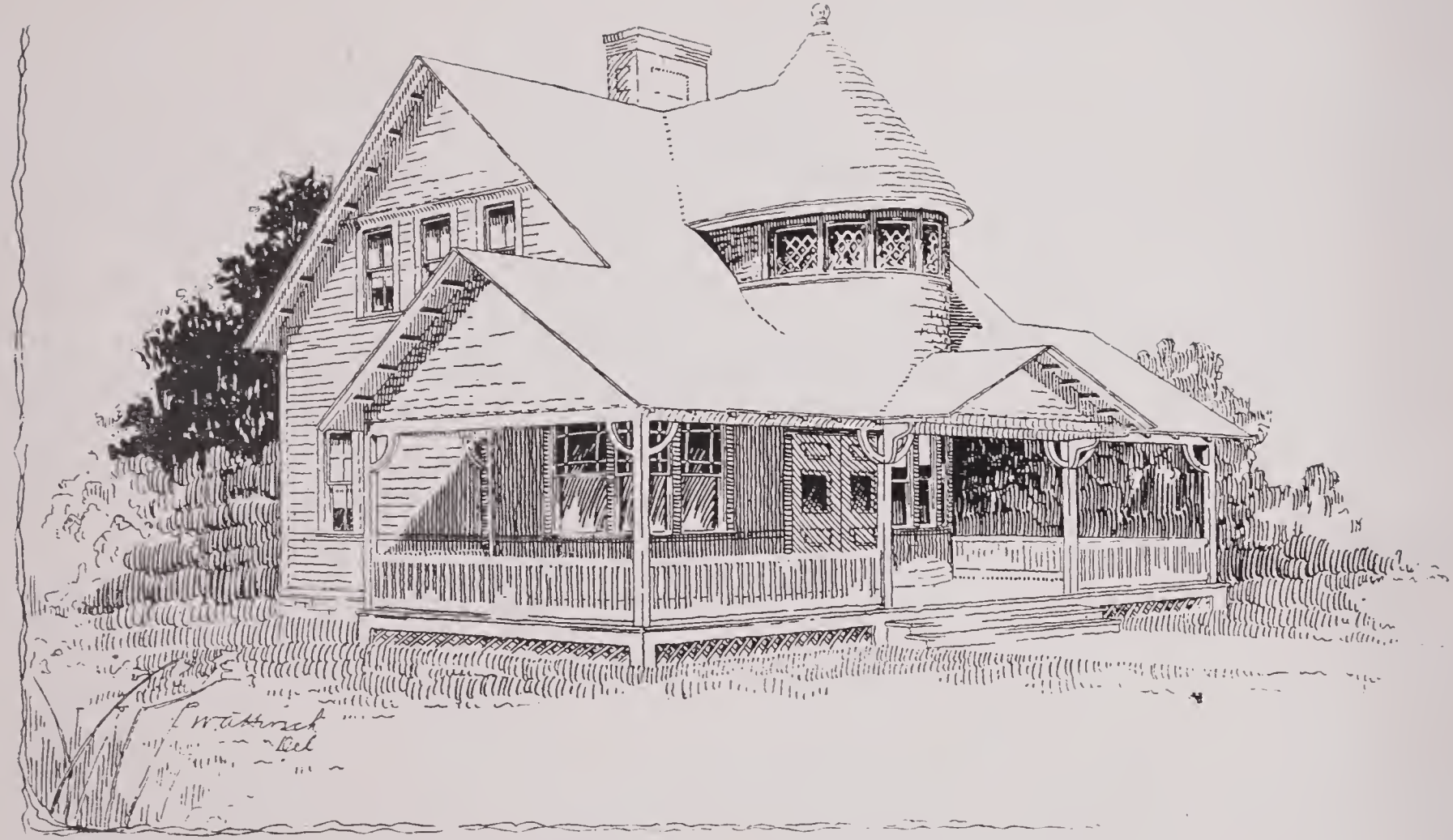
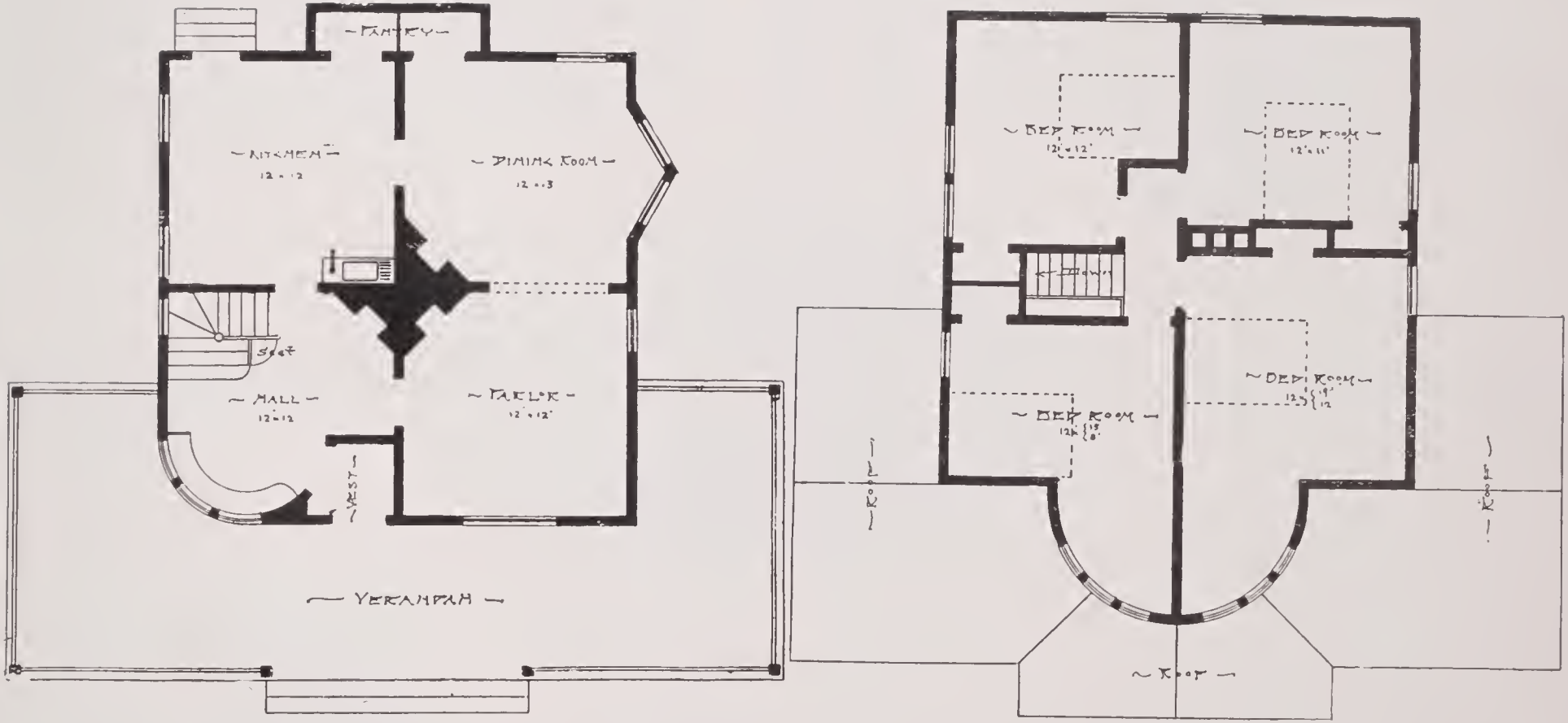


CHARLES E. ILLSLEY, A.M.C.E., ARCHITECT, ST. LOUIS.

DESIGN A.

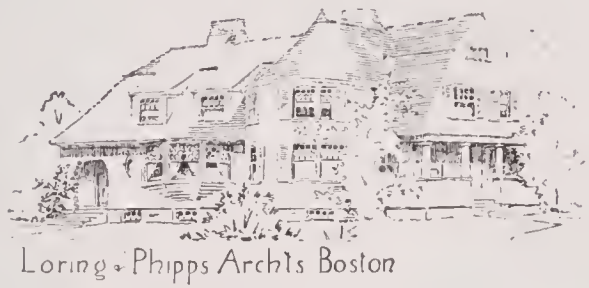
See floor plans on page 77.



FLOOR PLANS FOR DESIGN A.

See page 76.

CABOT'S CREOSOTE SHINGLE STAINS



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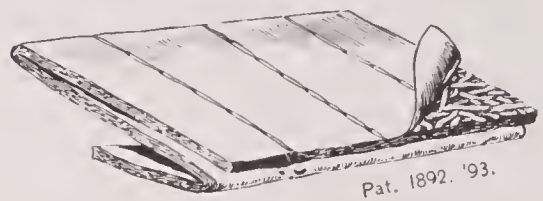

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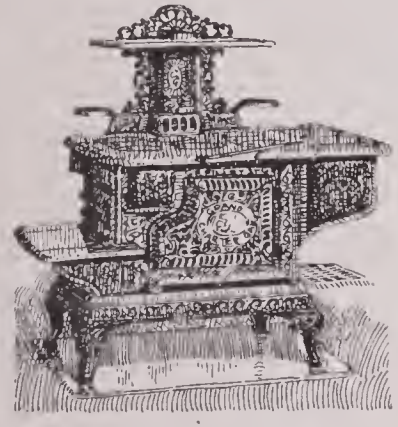

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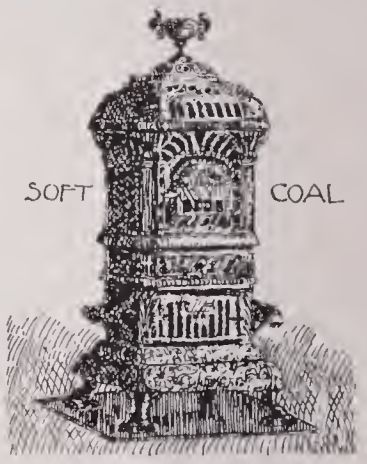
CHARTER OAK STOVES



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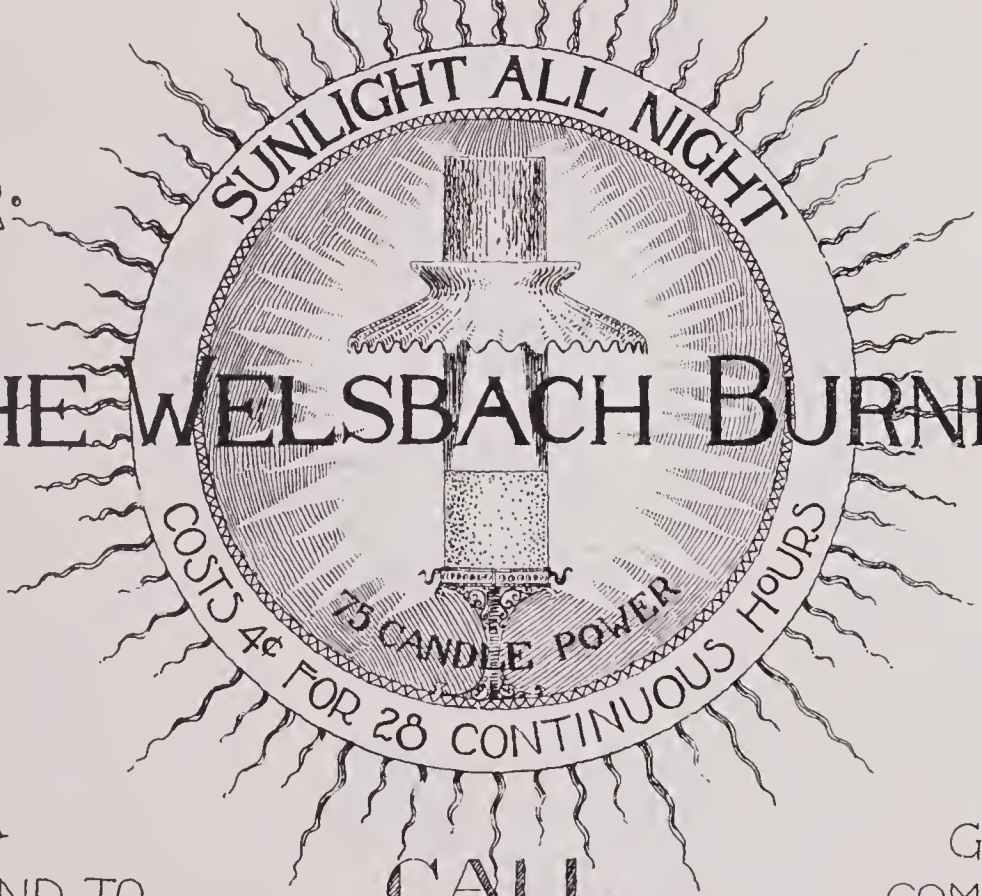

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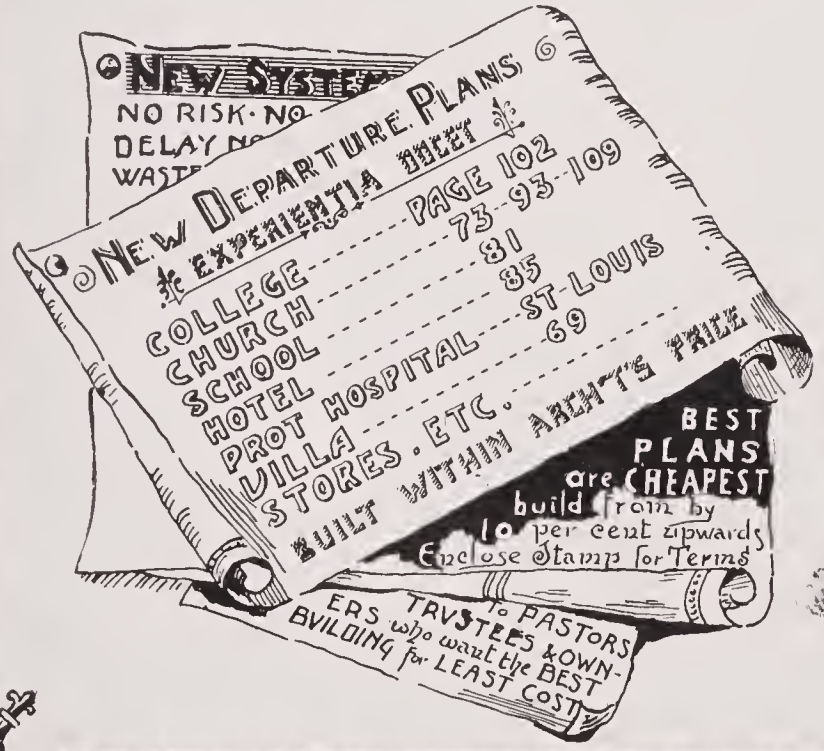

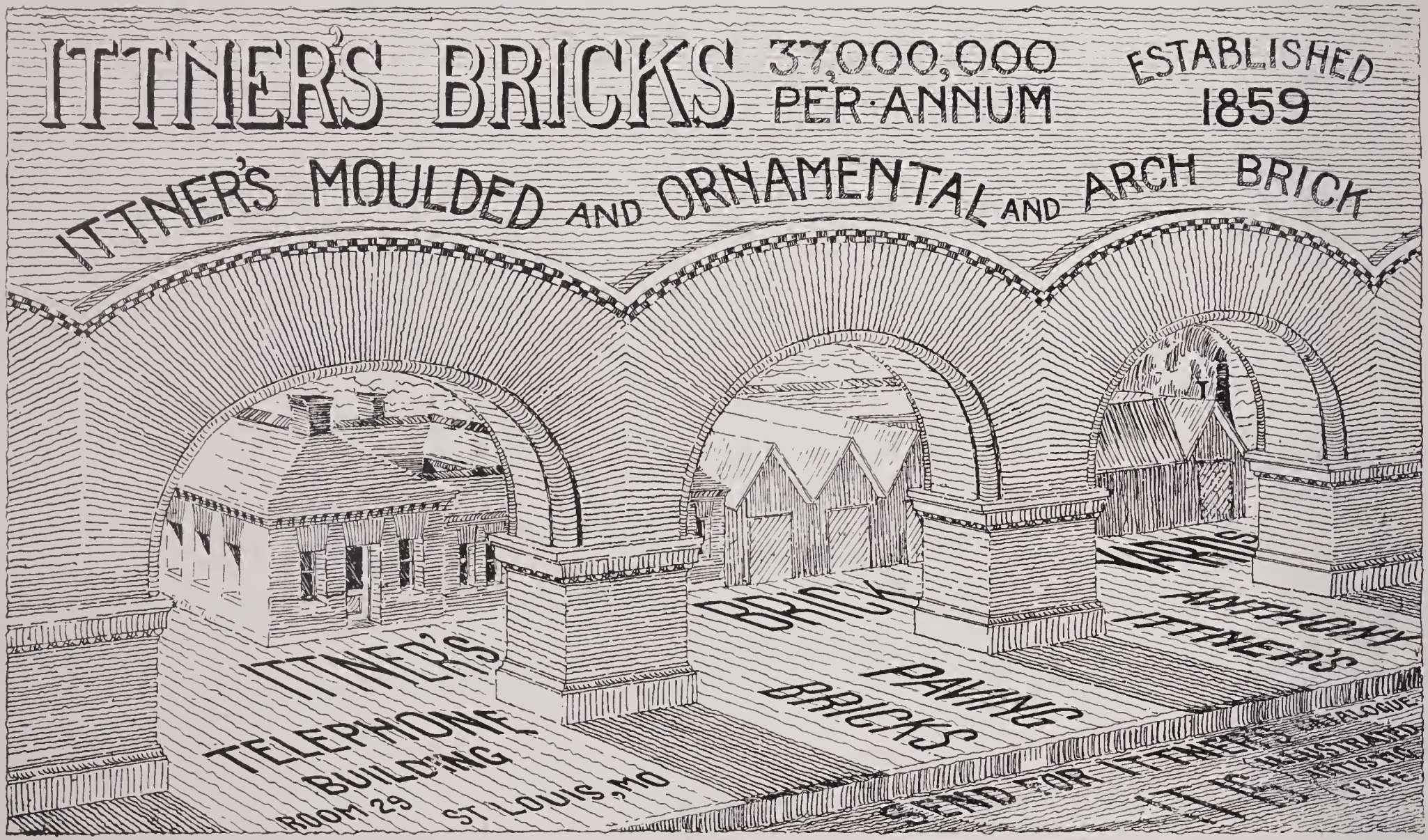
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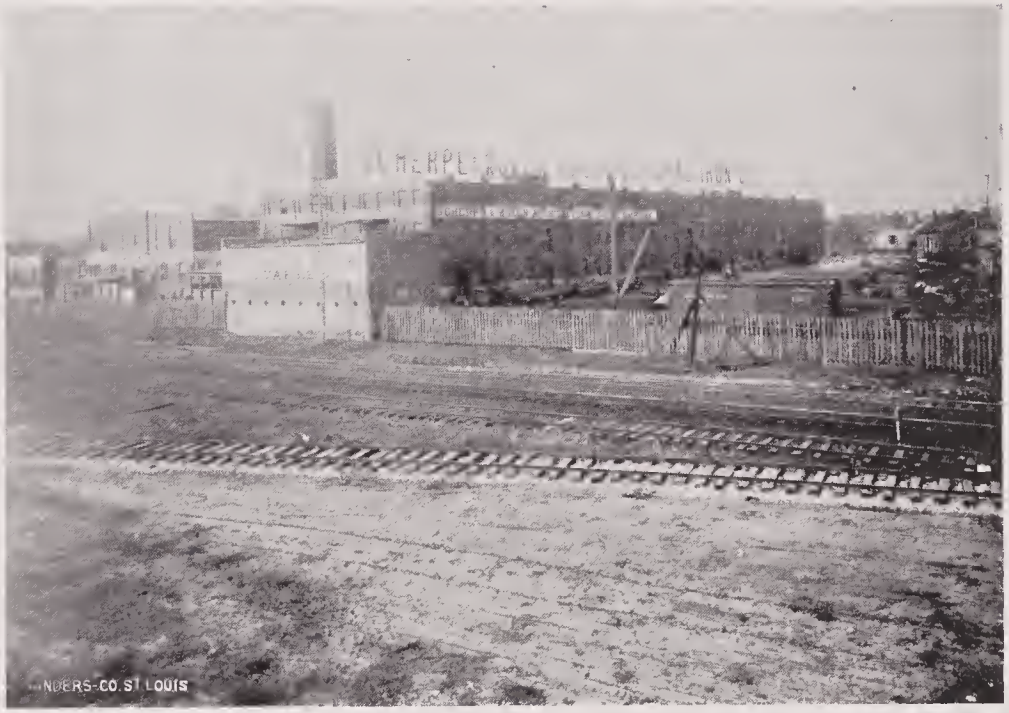

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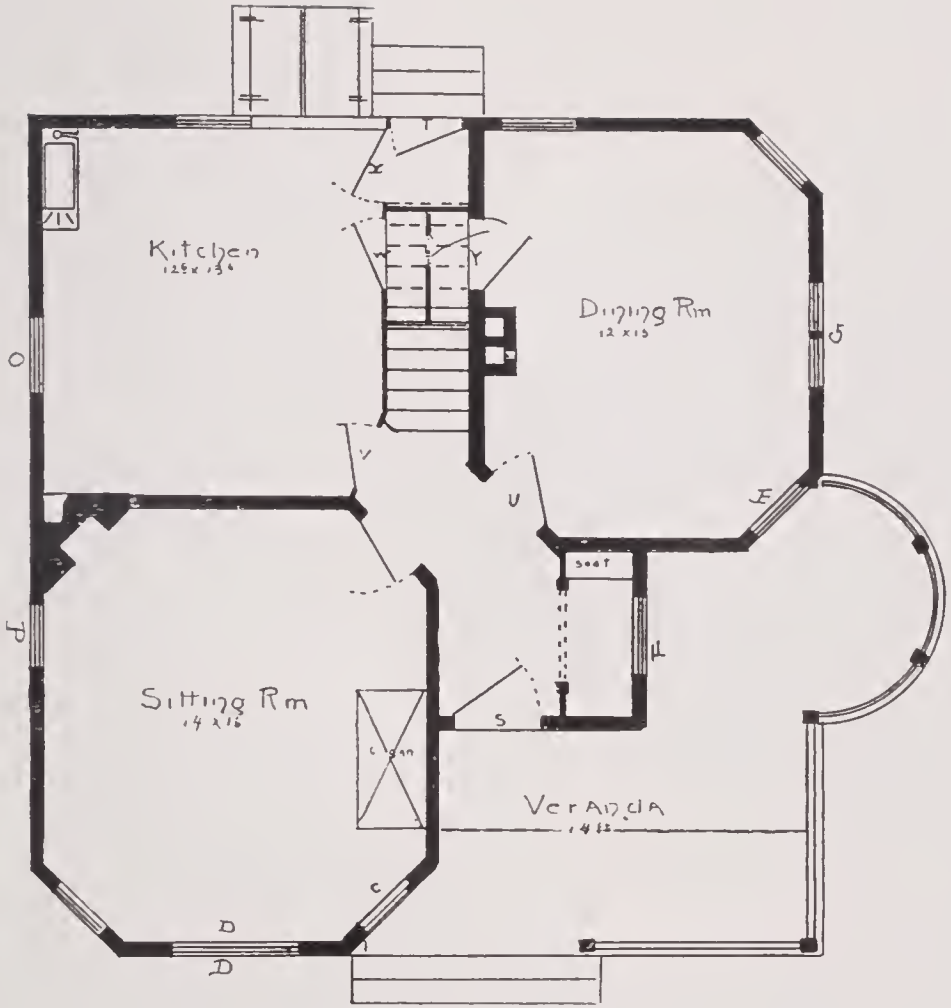
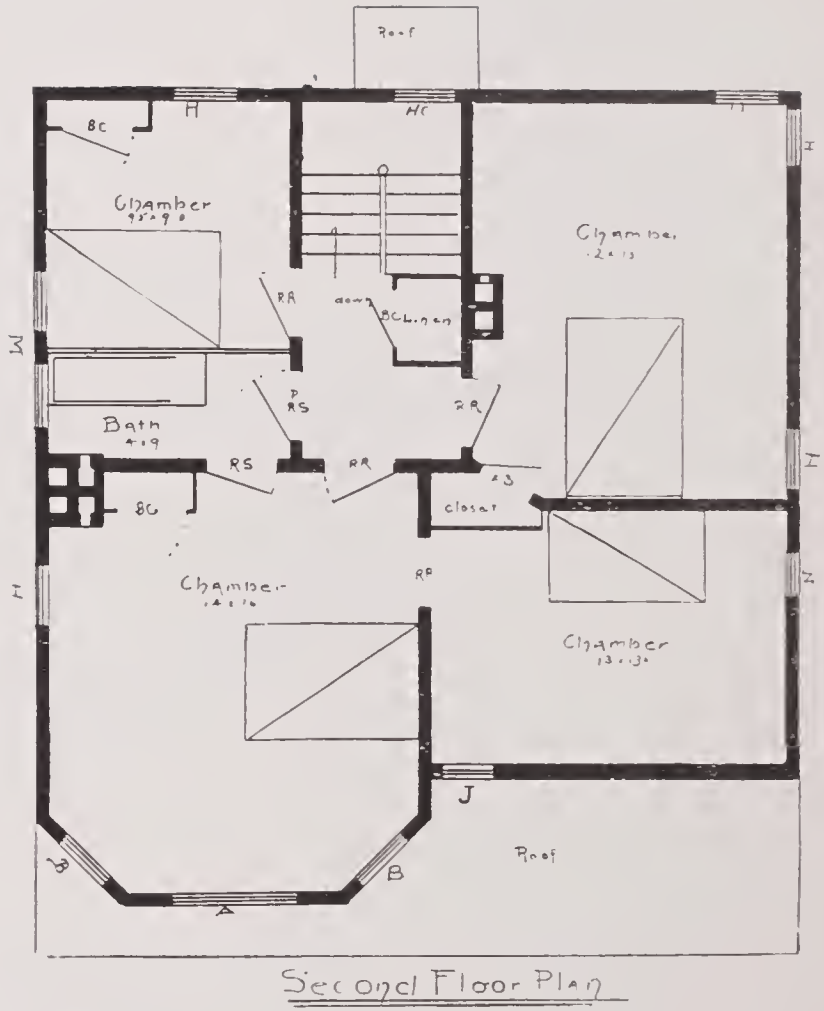
DESIGN B.

See floor plans on page 89.





FLOOR PLANS FOR DESIGN B.

See page 88.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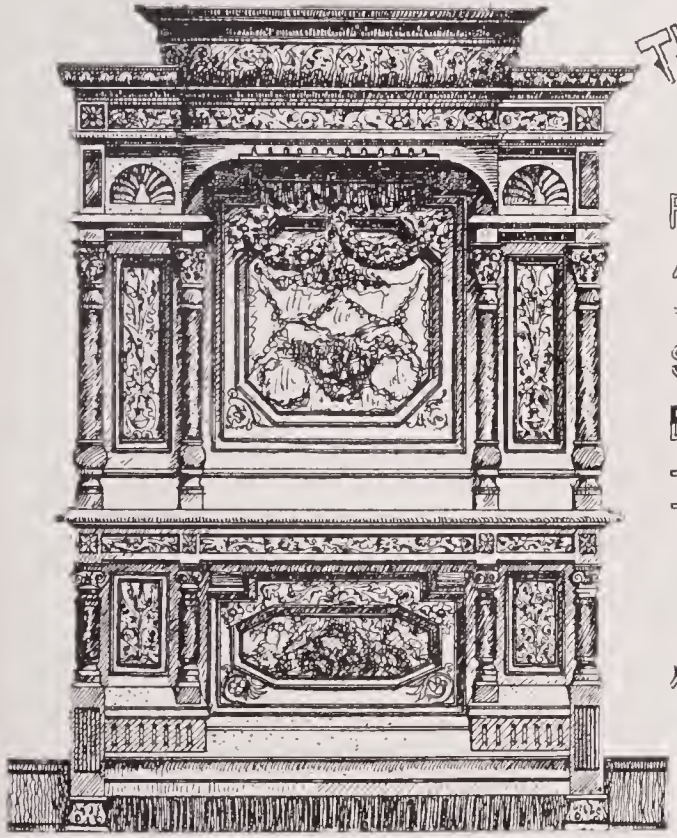

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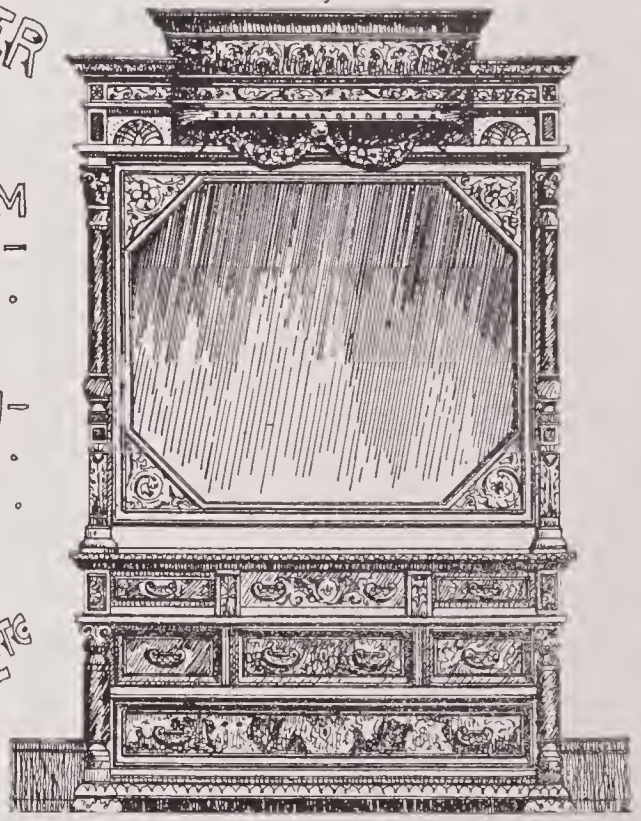

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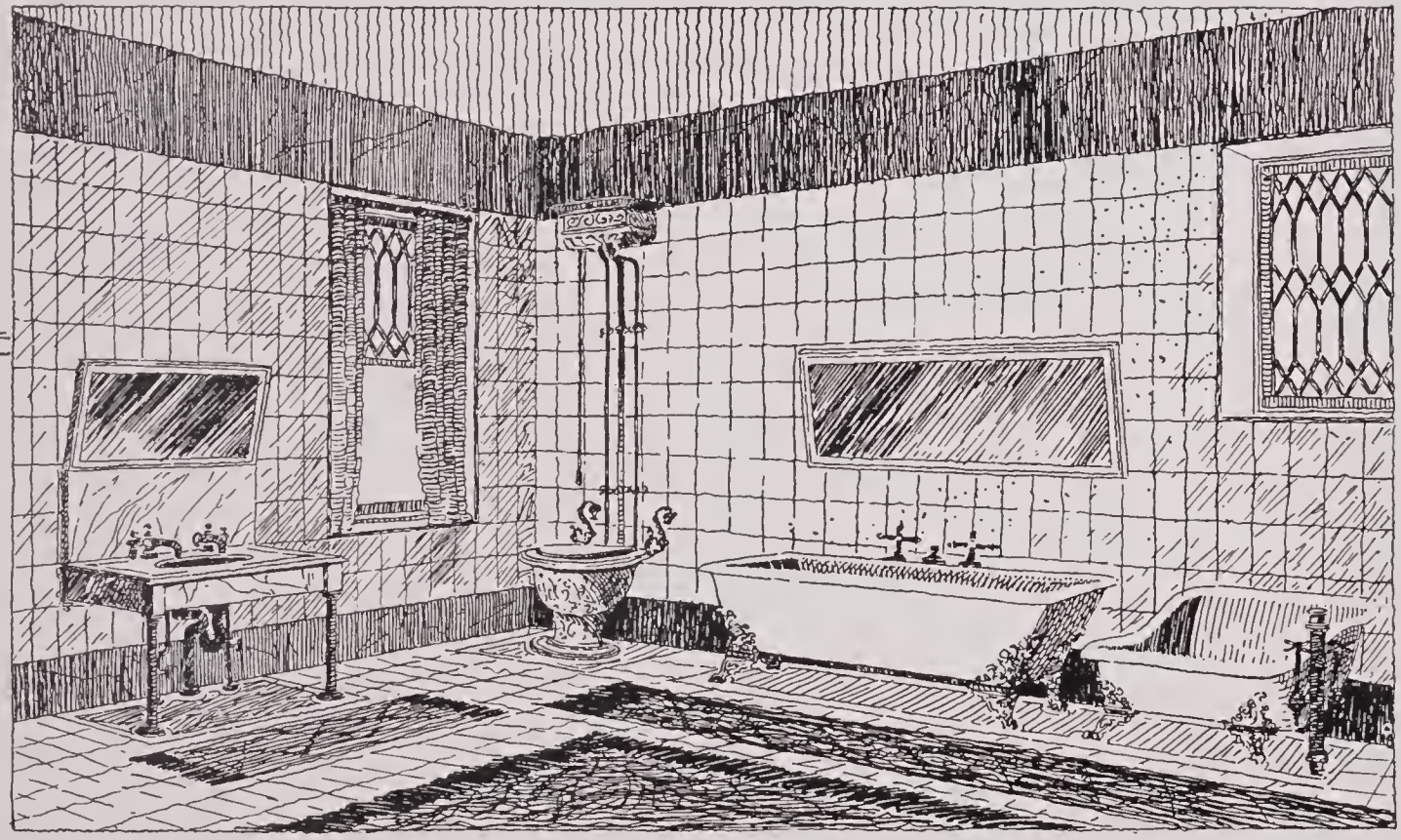

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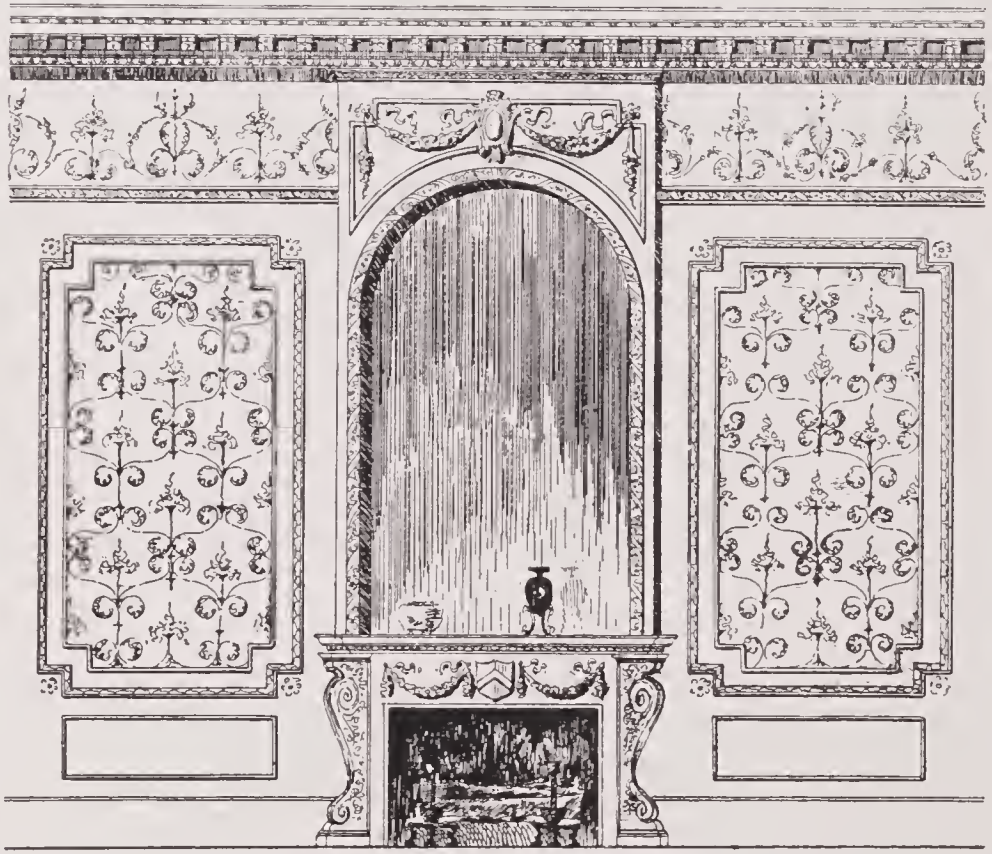

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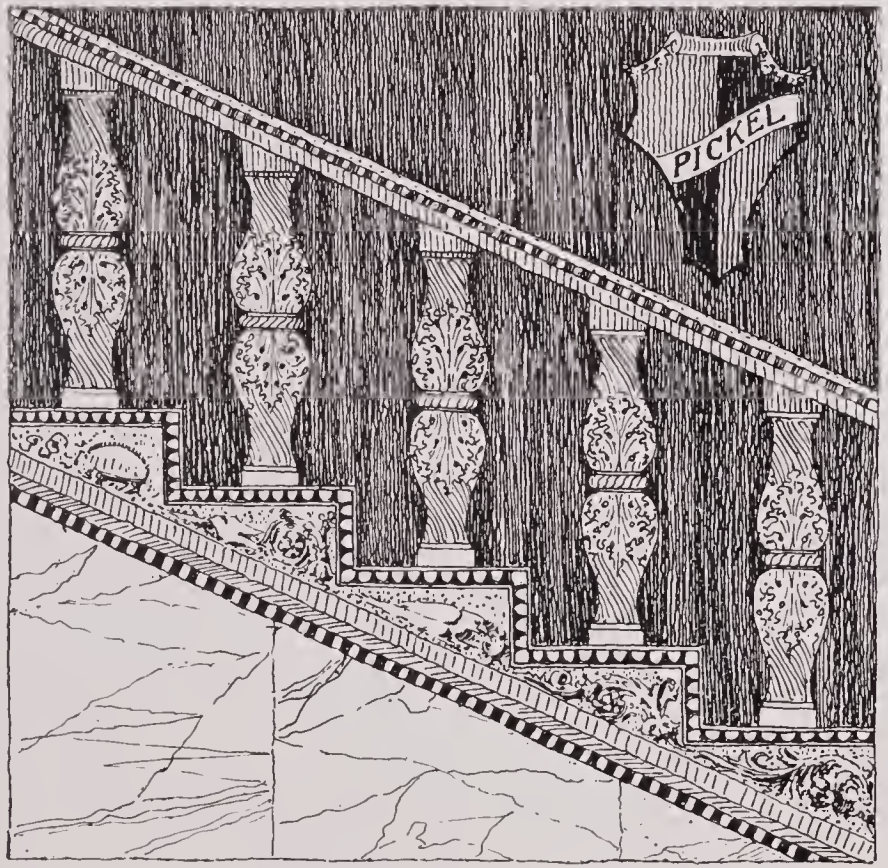

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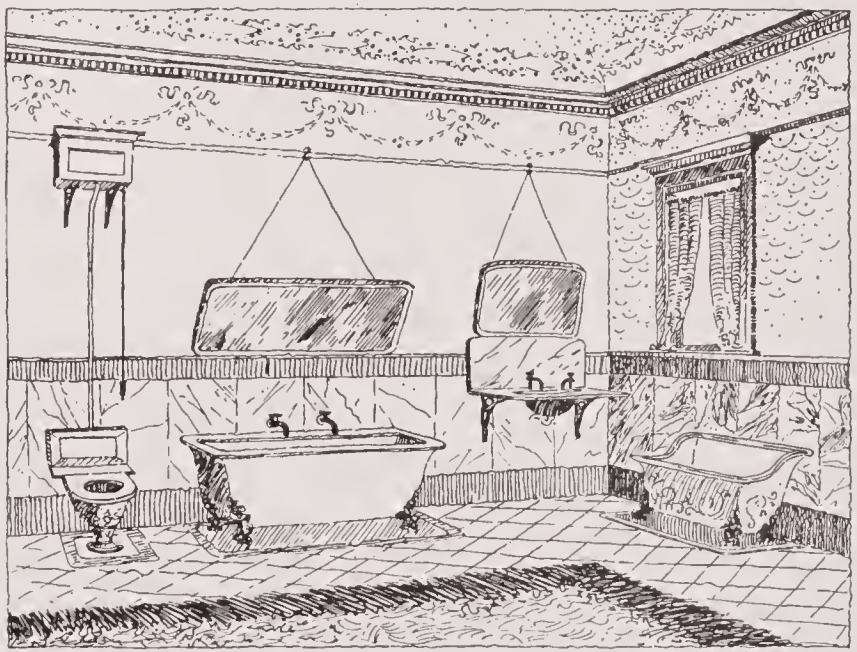

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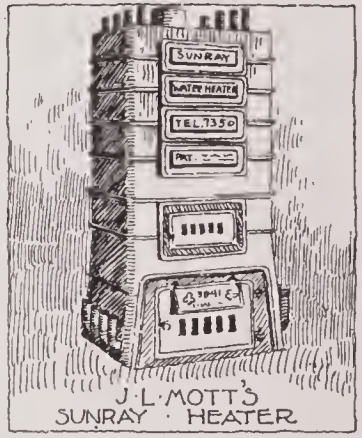

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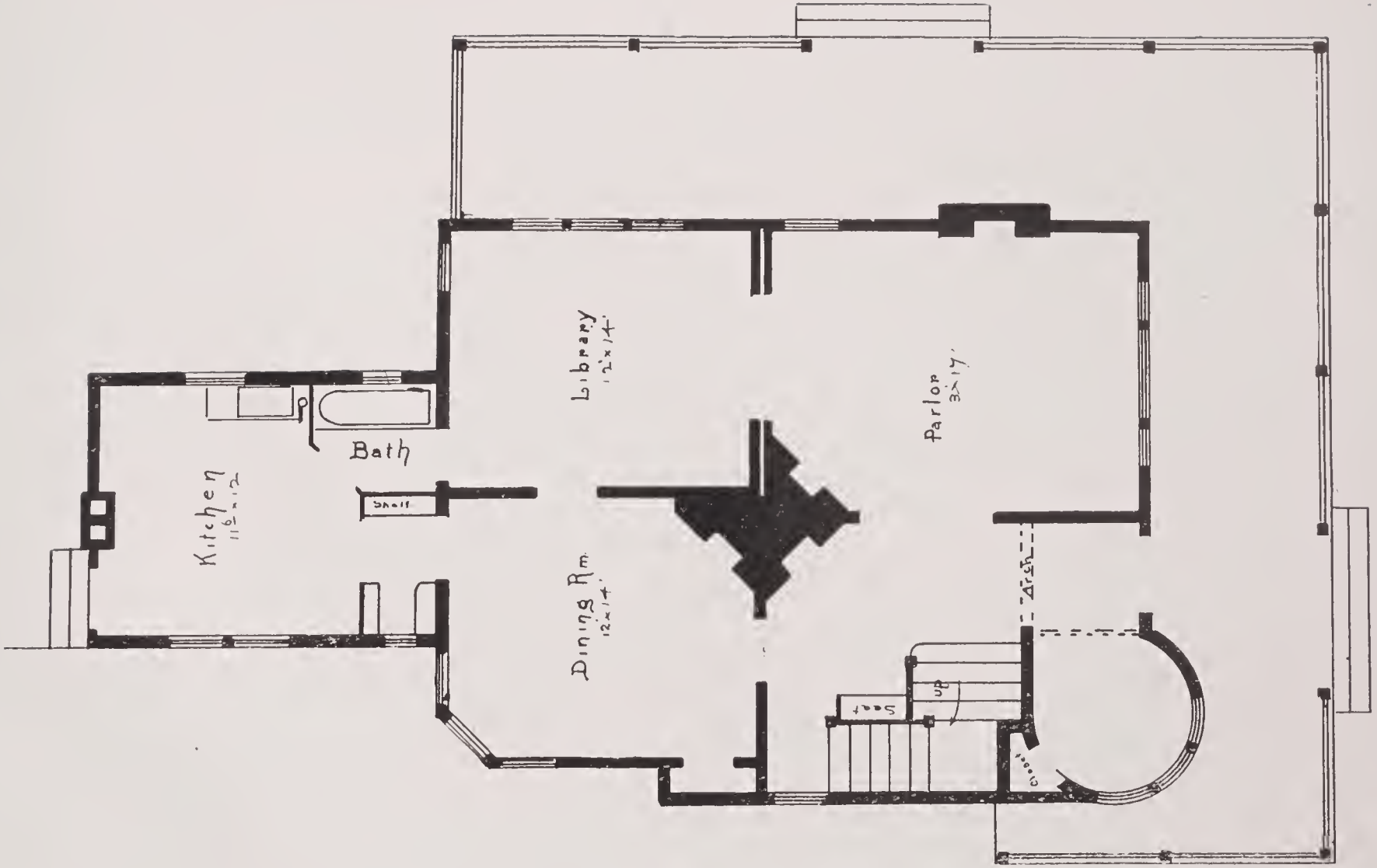
DESIGN C.—See floor plans on page 99.



FIRST FLOOR PLAN FOR DESIGN C.

See page 98.

SIMMONS HARDWARE CO

S-W-COR. 9TH. ST. & WASHINGTON AVE.

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LARGEST IN THE WORLD STOCK

FURNISHED THE FOLLOWING

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THE LARGEST STOCK OF ART GOODS IN THE CITY

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BROADWAY & LOCUST.

EX UNO DISCE OMNES.

CHARLES E. ILLSLEY, A.M.C.E., Architect, St. Louis.

MISSOURI VALLEY COLLEGE, MARSHALL, MO.

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HARDWARE FOR HARD TIMES
SHAPLEIGH'S COMBINATION SETS
HARDWARE COMPLETE FOR SMALL HOUSES
SET No 1 FOUR ROOM HOUSE HARDWARE COMPLETE FOR $10
SET No 2 FIVE " " " " " $16
SET No 3 SIX " " " " " $22
SET No 4 EIGHT " " " " " $30
ALSO ELEGANT BRASS BRONZE SILVER NICKEL AND RUST-PROOF HARDWARE
SEND FOR ILLUSTRATIONS & PRICES
A F SHAPLEIGH HARDWARE CO
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WALLIS-DWYER DECORATING CO.,

INTERIOR DECORATORS.

MVRAL PAINTERS

2000 and 2002 Locvst St.

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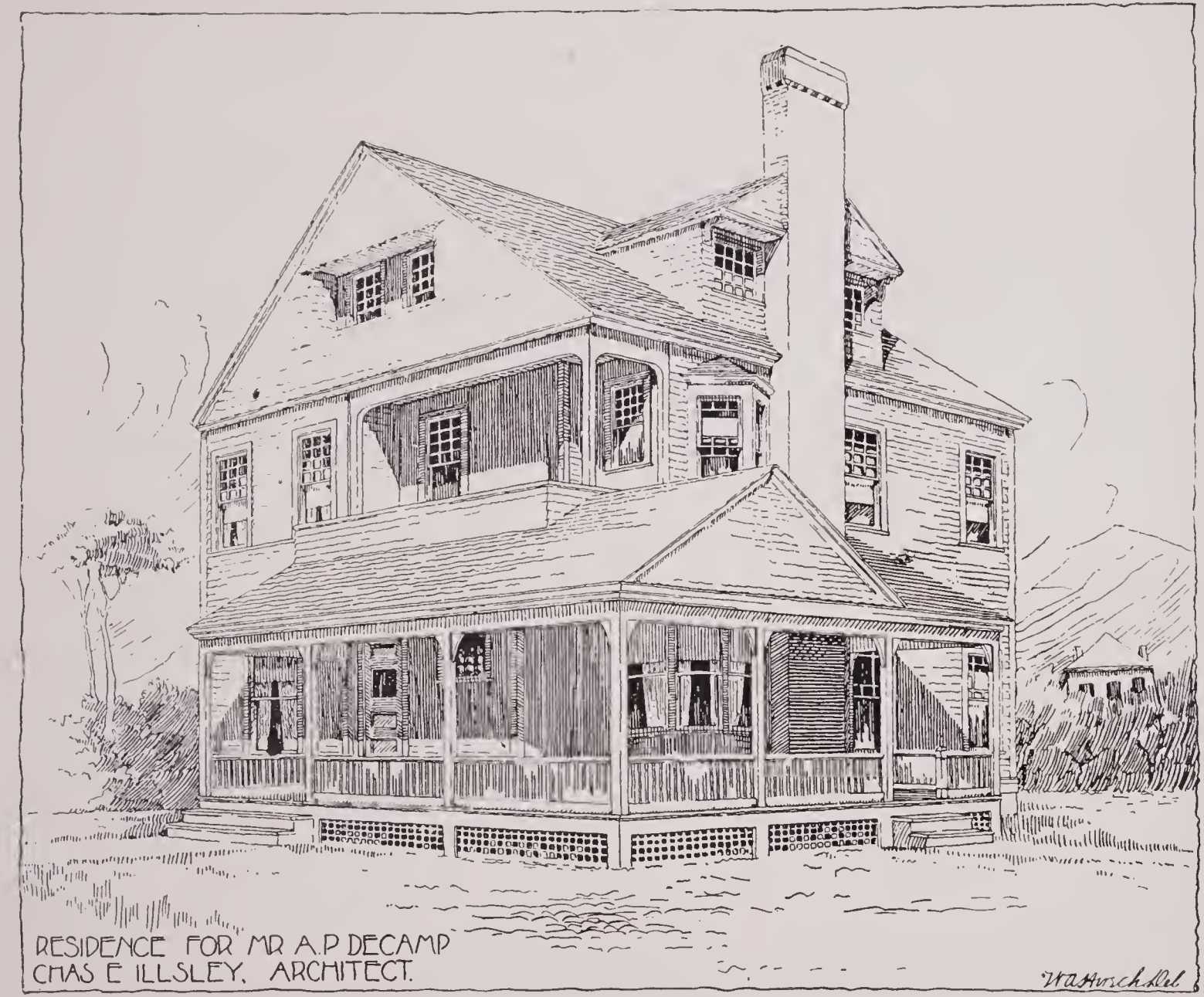
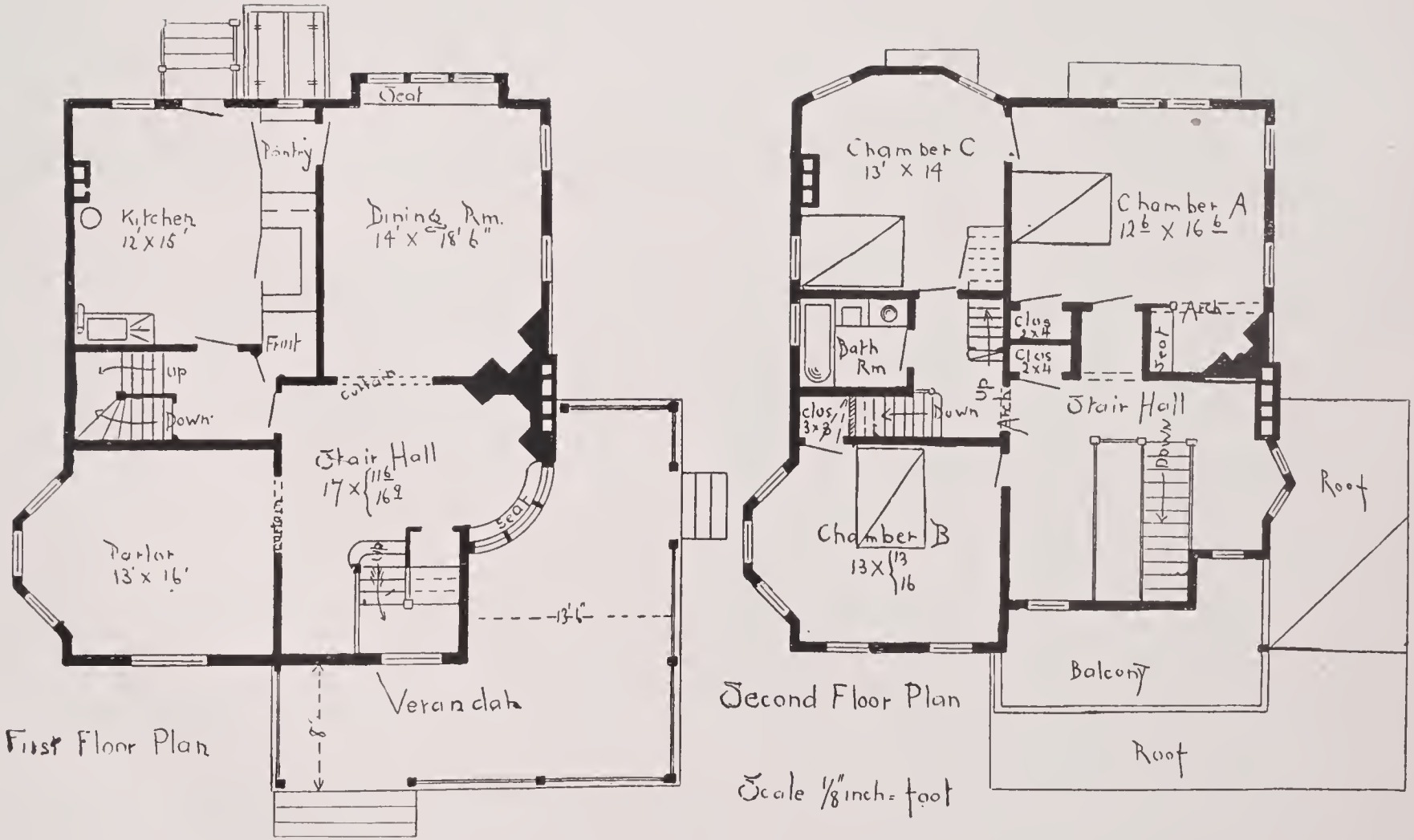


DESIGN D.—See floor plans on page 107.



FLOOR PLANS FOR DESIGN D.

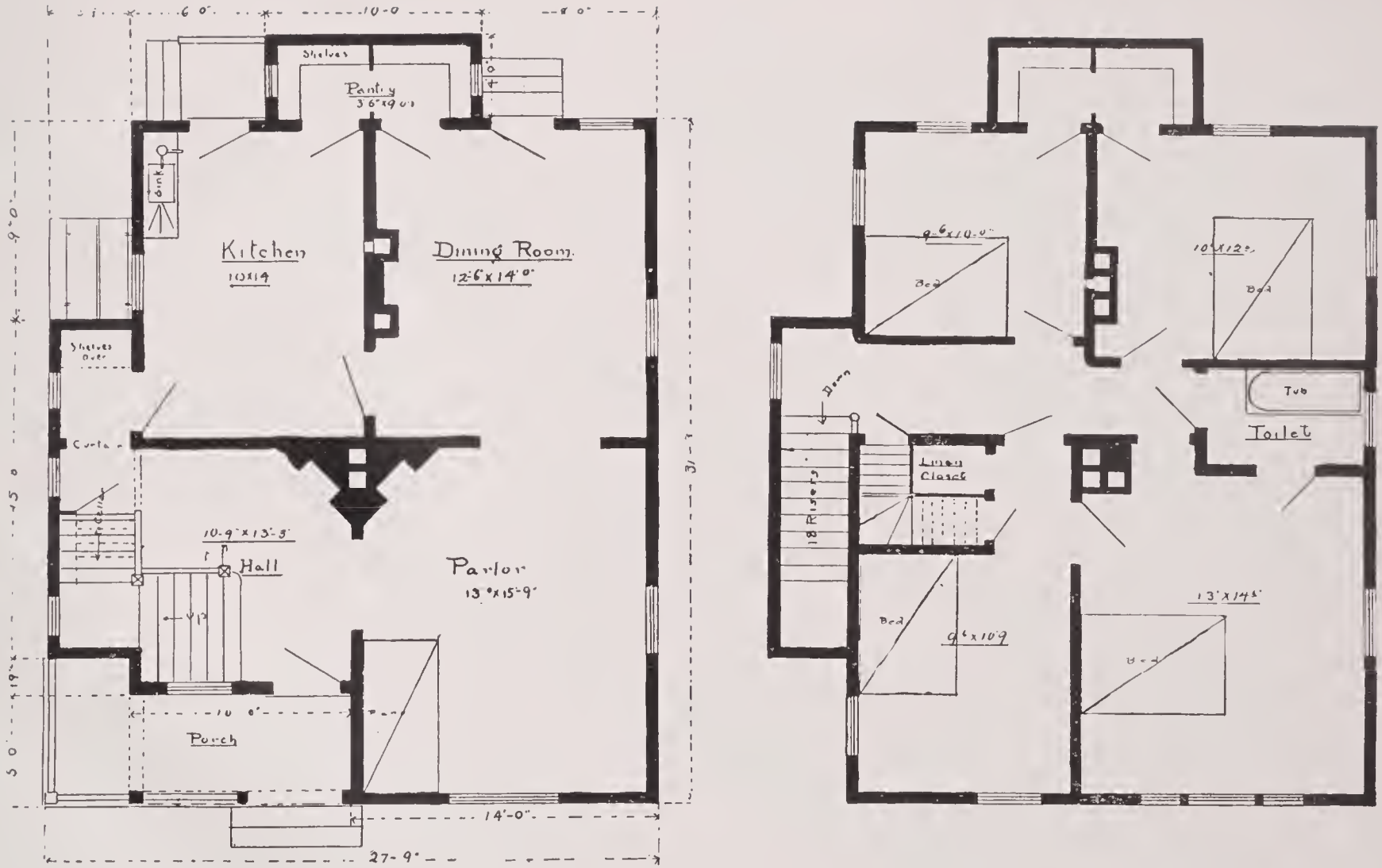
See page 106.

EX UNO DISCE OMNES. CHARLES E. ILLSLEY, A.M C.E., Architect. St. Louis.

CUMBERLAND PRESBYTERIAN CHURCH, ST. LOUIS.

Original drawing adopted before the building was contracted for.
A comparison of this view with that on page 73, taken from the edifice after completion, will show how accurately the work was executed.

DESIGN E.—See floor plans on page 111.



FIRST AND SECOND FLOOR PLANS FOR DESIGN E.

See page 110.

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J. L. WILSON, VICE-PRES'T.

W. E. ALTHAUS, SEC. & TREAS.

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